

ULTIMATE KCET CRASH COURSE 2026

CHEMISTRY

DPP: 1

Electrochemistry

- Q1** The specific conductance and conductance of a solution are $0.2 \Omega^{-1} \text{ cm}^{-1}$ and $0.04 \Omega^{-1}$, respectively. The cell constant is:
 (A) 0.2 cm^{-1} (B) 1 cm^{-1}
 (C) 5 cm^{-1} (D) 0.5 cm^{-1}
- Q2** SI base units of resistance is equal to
 (A) $\text{kg m}^2 \text{ S}^{-3} \text{ A}^{-2}$
 (B) $\text{kg m}^3 \text{ S}^{-3} \text{ A}^{-2}$
 (C) $\text{kg m}^2 \text{ S}^{-2} \text{ A}^{-3}$
 (D) $\text{kg m S}^{-2} \text{ A}^{-3}$
- Q3** When a quantity of electricity is passed through CuSO_4 solution, 0.16 g of copper gets deposited. If the same quantity of electricity is passed through acidulated water, then the volume of H_2 liberated at STP will be [Given, atomic weight of Cu = 64]
 (A) 4.0 cm^3 (B) 56 cm^3
 (C) 604 cm^3 (D) 8.0 cm^3
- Q4** $E_{\text{Cu}}^\circ = -0.34 \text{ V}$, $E_{\text{Zn}}^\circ = 0.76 \text{ V}$. A Daniel cell contains 0.1 M ZnSO_4 solution and 0.01 M CuSO_4 solution at its electrodes. EMF of the cell is
 (A) 1.10 V (B) 1.04 V
 (C) 1.16 V (D) 1.07 V
- Q5** E_1, E_2 , and E_3 are the emfs of the following three galvanic cells respectively
 1. $\text{Zn (s)} \mid (0.1 \text{ M}) \parallel (1 \text{ M}) \mid \text{Cu (s)}$
 2. $\text{Zn (s)} \mid (1 \text{ M}) \parallel (1 \text{ M}) \mid \text{Cu (s)}$
 3. $\text{Zn (s)} \mid (1 \text{ M}) \parallel (0.1 \text{ M}) \mid \text{Cu (s)}$
 Which one of the following is true?
 (A) $E_2 > E_1 > E_3$
 (B) $E_1 > E_2 > E_3$
 (C) $E_3 > E_1 > E_2$
 (D) $E_3 > E_2 > E_1$
- Q6** Identify the INCORRECT statement.
 A. The molar conductivity of weak electrolytes increases rapidly on dilution.
 B. The molar conductivity of strong electrolytes varies linearly with square root of concentration.
 C. Both cation and anion contribute to molar conductivity of the electrolyte at zero concentration.
 D. Electrolytic conductivity of a solution increases with decrease in concentration of solution.
 (A) Option (C)
 (B) Option (A)
 (C) Option (B)
 (D) Option (D)
- Q7** Limiting molar ionic conductivities of a uni-valent electrolyte are 57 and 73, the limiting molar conductivity of the solution will be.
 (A) $130 \text{ S cm}^2 \text{ mol}^{-1}$
 (B) $65 \text{ S cm}^2 \text{ mol}^{-1}$
 (C) $260 \text{ S cm}^2 \text{ mol}^{-1}$
 (D) $187 \text{ S cm}^2 \text{ mol}^{-1}$



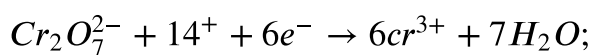
- Q8** The molar conductivity of 0.025 mol L^{-1} methanoic acid is $46.1 \text{ S cm}^2 \text{ mol}^{-1}$. If $\lambda(\text{H}^+) = 349.6 \text{ S cm}^2 \text{ mol}^{-1}$ and $\lambda(\text{HCOO}^-) = 54.6 \text{ S cm}^2 \text{ mol}^{-1}$ its degree of dissociation is
 (A) 34% (B) 25%
 (C) 5% (D) 11.4%
- Q9** The standard reduction potentials for Zn^{2+}/Zn , Ni^{2+}/Ni and Fe^{2+}/Fe are -0.76 , -0.23 and -0.44V respectively. The reaction $\text{X} + \text{Y}^{2+} \rightarrow \text{X}^{2+} + \text{Y}$ will be spontaneous when
 (A) $\text{X} = \text{Zn}$, $\text{Y} = \text{Ni}$ (B) $\text{X} = \text{Ni}$, $\text{Y} = \text{Fe}$
 (C) $\text{X} = \text{Ni}$, $\text{Y} = \text{Zn}$ (D) $\text{X} = \text{Fe}$, $\text{Y} = \text{Zn}$
- Q10** Faraday's laws of electrolysis will fail when
 (A) temperature is increased
 (B) inert electrodes are used
 (C) a mixture of electrolytes is used
 (D) None of these cases
- Q11** The emf of the cell
 $\text{Mg}|\text{Mg}^{2+}(0.01\text{M})$
 $\parallel \text{Sn}^{2+}(0.1\text{M})|\text{Sn}$ at 298 K
 is (Given, $E^\circ_{\text{Mg}^{2+}, \text{Mg}} = -2.34\text{V}$, $E^\circ_{\text{Sn}^{2+}, \text{Sn}} = -0.14\text{V}$)
 (A) 2.23 V (B) 1.86 V
 (C) 1.56 V (D) 3.26 V
- Q12** How many minutes will it take to plate out 5.2 g of Cr from a $\text{Cr}_2(\text{SO}_4)_3$ solution using a current of 9.65 A ? (Atomic weight: $\text{Cr} = 52.0$)
 (A) 200 (B) 50
 (C) 100 (D) 103
- Q13** The position of some metals in the electrochemical series in decreasing electropositive character is given as $\text{Mg} > \text{Al} > \text{Zn} > \text{Cu} > \text{Ag}$. What will happen, if a copper spoon is used to stir a solution of aluminium nitrate?
 (A) The spoon will get coated with Al
 (B) An alloy of Cu and Al is formed
 (C) The solution becomes blue
 (D) There is no reaction
- Q14** Find the emf of the cell in which following reaction takes place at 298 K .
 $\text{Ni}_{(\text{s})} + 2 \text{Ag}^+(0.001\text{M}) \rightarrow \text{Ni}^{2+}(0.001\text{M}) + 2 \text{Ag}_{(\text{s})}$
 Given that
 $E^\circ_{\text{cell}} = 1.05 \text{ V}$, $\frac{2.303 RT}{F} = 0.059$ at 298 K
 (A) 1.0385 V (B) 1.385 V
 (C) 0.9615 V (D) 1.05 V
- Q15** The increase in the value of molar conductivity of acetic acid with dilution is due to
 (A) decrease in inter ionic forces & increase in
 (B) increase in the degree of ionization and inter ionic forces
 (C) Increase in self ionization of water
 (D) None of these
- Q16** Composition of the cathode in the lead storage battery.
 (A) Pb (B) PbO_2
 (C) Pb and PbO_2 (D) PbSO_4
- Q17** 4.5 g of Al (at. mass 27 amu) is deposited at cathode from Al^{3+} solution by a certain quantity of charge. The volume of H_2 produced at STP from H^+ ions in solution by the same quantity of charge will be
 (A) 11.2 L (B) 44.8 L
 (C) 5.6 L (D) 22.4 L



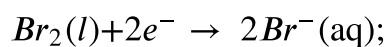
- Q18** Which of the following reactions is used to make a fuel cell?
 (A) $\text{Cd(s)} + 2\text{Ni(OH)}_3\text{(s)} \rightarrow \text{CdO(s)} + 2\text{Ni(OH)}_2\text{(s)} + \text{H}_2\text{O(l)}$
 (B) $\text{Pb(s)} + \text{PbO}_2\text{(s)} + 2\text{H}_2\text{SO}_4\text{(aq)} \rightarrow 2\text{PbSO}_4\text{(s)} + 2\text{H}_2\text{O(l)}$
 (C) $2\text{H}_2\text{(g)} + \text{O}_2\text{(g)} \rightarrow 2\text{H}_2\text{O(l)}$
 (D) $2\text{Fe(s)} + \text{O}_2\text{(g)} + 4\text{H}^+\text{(aq)} \rightarrow 2\text{Fe}^{2+}\text{(aq)} + 2\text{H}_2\text{O(l)}$
- Q19** Total charge required for the oxidation of two moles Mn_3O_4 into MnO_4^{2-} in presence of alkaline medium is:
 (A) 5 F (B) 10 F
 (C) 20 F (D) None of these
- Q20** When a certain conductivity cell was filled with 0.020 M KCl which has a specific conductivity $0.2768\ \Omega^{-1}\ \text{m}^{-1}$, it had a resistance of 8.240 at 25°C. With 0.0025 M K_2SO_4 , it has a resistance of $326.0\ \Omega$. The conductivity of K_2SO_4 solution is
 (A) 2.28 (B) 0.07
 (C) 0.54 (D) 0.005
- Q21** 4.5 g of Al (at. mass 27 amu) is deposited at cathode from Al^{3+} solution by a certain quantity of charge. The volume of H_2 produced at STP from H^+ ions in solution by the same quantity of charge will be
 (A) 11.2 L (B) 44.8 L
 (C) 5.6 L (D) 22.4 L
- Q22** In the cell reaction,
 $\text{Cu(s)} + 2\text{Ag}^+\text{(aq)} \rightarrow \text{Cu}^{2+}\text{(aq)} + 2\text{Ag(s)}$; $E_{\text{cell}}^\circ = 0.46\ \text{V}$.
 By doubling the concentration of Cu^{2+} , E_{cell} is
 (A) Doubled
 (B) Decreased by small fraction
 (C) Halved
 (D) Increased but less than doubled.
- Q23** The correct statement about mercury cell and nickel-cadmium cell is
 (A) Both are secondary cells
 (B) Both are primary cells
 (C) Mercury cell is primary cell and nickel-cadmium cell is secondary cell
 (D) Nickel-cadmium cell is primary cell and mercury cell is secondary cell
- Q24** The emf of the cell $\text{Zn} | \text{Zn}^{2+} (0.01\ \text{M}) || \text{Fe}^{2+} (0.001\ \text{M}) | \text{Fe}$ at 298 K is 0.2905 then the value of equilibrium constant for the cell reaction is
 (A) $10^{\frac{0.32}{0.0591}}$ (B) $10^{\frac{0.32}{0.0295}}$
 (C) $e^{\frac{0.32}{0.0295}}$ (D) $10^{\frac{0.26}{0.0295}}$
- Q25** Specific conductance of 0.1 M HNO_3 is $6.3 \times 10^{-2}\ \text{ohm}^{-1}\ \text{cm}^{-1}$. The molar conductance of the solution is
 (A) $315\ \text{ohm}^{-1}\ \text{cm}^2\ \text{mol}^{-1}$
 (B) $6.300\ \text{ohm}^{-1}\ \text{cm}^2\ \text{mol}^{-1}$
 (C) $63.0\ \text{ohm}^{-1}\ \text{cm}^2\ \text{mol}^{-1}$
 (D) $630\ \text{ohm}^{-1}\ \text{cm}^2\ \text{mol}^{-1}$
- Q26** For the cell reaction
 $2\text{Fe}_{(\text{aq})}^{3+} + 2\text{I}_{(\text{aq})}^- \rightarrow 2\text{Fe}_{(\text{aq})}^{2+} + \text{I}_{2(\text{aq})}$, $E_{\text{cell}}^\circ = 0.24\ \text{V}$ at 298 K. The standard Gibbs energy ($\Delta_r G^\circ$) of the cell reaction is [Given that Faraday constant, $F = 96500\ \text{C mol}^{-1}$]
 (A) $23.16\ \text{kJ mol}^{-1}$
 (B) $-46.32\ \text{kJ mol}^{-1}$
 (C) $-23.16\ \text{kJ mol}^{-1}$
 (D) $46.32\ \text{kJ mol}^{-1}$
- Q27** Standard aluminium electrode is coupled with SHE. It gives an emf of 1.66V. Standard electrode potential of aluminium is
 (A) -1.66 V (B) +1.66 V
 (C) -0.83 V (D) +0.83 V



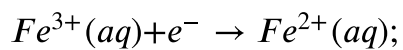
Q28 Arrange the following oxidizing agents in order of increasing strength under standard state conditions



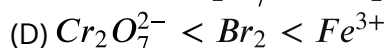
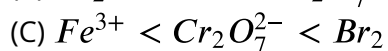
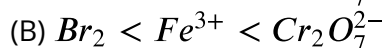
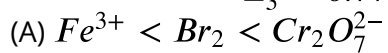
$$E_1^\circ = 1.33\text{V}$$



$$E_2^\circ = 1.06\text{V}$$



$$E_3^\circ = 0.77\text{V}$$



Q29 Given

$$E_{\text{Ag}^+/\text{Ag}}^0 = 0.8\text{V} \quad E_{\text{Co}^{2+}/\text{Co}}^0 = -0.28\text{V}$$

$$E_{\text{Cu}^{2+}/\text{Cu}}^0 = 0.34\text{V} \quad E_{\text{Zn}^{2+}/\text{Zn}}^0 =$$

$$-0.76\text{V}$$

Which metal will corrode fastest

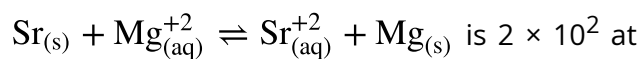
(A) Ag

(B) Cu

(C) Co

(D) Zn

Q30 The equilibrium constant for the reaction



is 2×10^2 at

25°C. The E° for a cell made up of Sr/Sr⁺² and

Mg⁺²/Mg half cell is;

(A) 0.0591 V

(B) 0.0679 V

(C) 0.0366 V

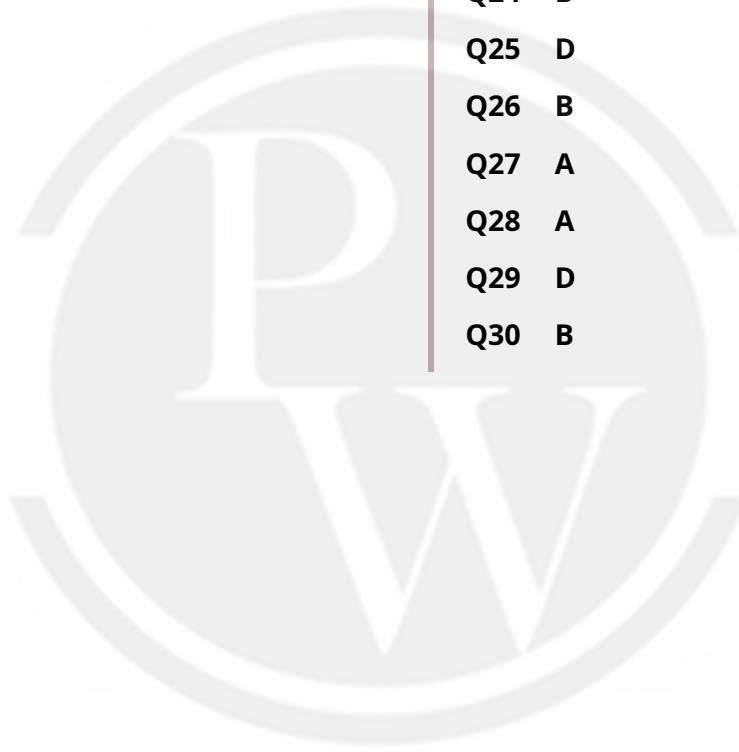
(D) 3.667 V



Answer Key

Q1 C
Q2 A
Q3 B
Q4 A
Q5 D
Q6 D
Q7 A
Q8 D
Q9 A
Q10 D
Q11 A
Q12 B
Q13 D
Q14 C
Q15 A

Q16 C
Q17 C
Q18 C
Q19 C
Q20 B
Q21 C
Q22 B
Q23 C
Q24 B
Q25 D
Q26 B
Q27 A
Q28 A
Q29 D
Q30 B



Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

$$\text{Cell constant } (G^*) = \frac{\text{Specific conductance } (\kappa)}{\text{Conductance } (G)}$$

$$= \frac{0.2}{0.04} = 5 \text{ cm}^{-1}$$

Video Solution:



Q2 Text Solution:

Resistance is given as ohms or volt/A .

The base units for volt is $\text{kg m}^{-2} \text{s}^{-3} \text{A}^{-1}$

$$\text{SI base unit for resistance} = \frac{\text{kg m}^{-2} \text{s}^{-3} \text{A}^{-1}}{\text{A}} = \text{kg m}^{-2} \text{s}^{-3} \text{A}^{-2}$$

Video Solution:



Q3 Text Solution:

According to second law of Faraday,

$$\frac{w_1}{E_1} = \frac{w_2}{E_2}$$

$$\frac{0.16}{64} = \frac{w_2}{2}$$

$$w_2 = \frac{0.16 \times 2}{64} = \frac{0.01}{2} = 0.005 \text{ g}$$

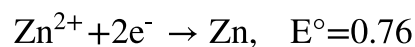
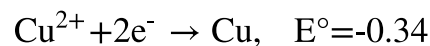
$$\text{Volume of } \text{H}_2 = \frac{0.005}{2} \times 22.400 \text{ cm}^3$$

$$= \frac{22.4}{4} = 56 \text{ cm}^3.$$

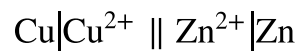
Video Solution:



Q4 Text Solution:



In the cell,



anode cathode in the cell,

$$E_{\text{cell}}^\circ = E_{\text{cathode}}^\circ - E_{\text{anode}}^\circ$$

$$= 0.76 - (-0.34) = 1.10\text{V}$$

Video Solution:



Q5 Text Solution:

For the given cell,

$$E_{\text{cell}} = E_{\text{cell}}^\circ - \frac{0.0591}{2} \log \frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]}$$

$$1. \quad E_1 = E_{\text{cell}}^\circ - \frac{0.0591}{2}$$

$$= E_{\text{cell}}^\circ - \frac{0.0591}{2}$$

$$2. \quad E_2 = E_{\text{cell}}^\circ - \frac{0.0591}{2} \log \frac{1}{1}$$

$$= E_{\text{cell}}^\circ - \frac{0.0591}{2} \times 0$$

$$= E_{\text{cell}}^\circ$$

$$3. \quad E_2 = E_{\text{cell}}^\circ - \frac{0.0591}{2} \log \frac{0.1}{1}$$

$$= E_{\text{cell}}^\circ + \frac{0.0591}{2}$$

Video Solution:



Q6 Text Solution:

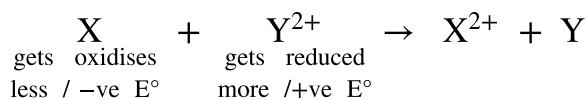
Electrolytic conductivity of a solution increases with decrease in concentration of solution.

Video Solution:**Q7 Text Solution:**

$$\Lambda_M^0 = \Lambda_a^0 + \Lambda_c^0.$$

Video Solution:**Q8 Text Solution:**

$$\begin{aligned} \lambda(\text{HCOOH}) &= \lambda^\circ(\text{H}^+) + \lambda^\circ(\text{HCOO}^-) \\ &= 349.6 + 54.6 = 404.2 \text{ S cm}^2 \text{ mol}^{-1} \\ \alpha &= \frac{\lambda_m}{\lambda_m^\circ} = \frac{46.1}{404.2} = 0.114 \Rightarrow \alpha = 11.4\% \end{aligned}$$

Video Solution:**Q9 Text Solution:****Video Solution:****Q10 Text Solution:**

Change in temperature, electrode or electrolyte composition does not effect faraday's law.

Video Solution:**Q11 Text Solution:**

Cell reaction is $\text{Mg} + \text{Sn}^{2+} \rightarrow \text{Mg}^{2+} + \text{Sn}$

$$\begin{aligned} E_{\text{cell}} &= E^\circ_{\text{cell}} - \frac{0.0591}{2} \log \frac{[\text{Mg}^{2+}]}{[\text{Sn}^{2+}]} \\ &= (2.34 - 0.14) - \frac{0.0591}{2} \log \frac{10^{-2}}{10^{-1}} = 2.23 \text{ V} \end{aligned}$$

Video Solution:**Q12 Text Solution:**

W=zeit

$$w = \frac{\text{At.mass}}{nF} \times it$$

$$5.2 = \frac{52}{3} \times \frac{9.65}{96,500} \times t(\text{sec.})$$

$$t(\text{sec}) = 3000$$

$$t(\text{min}) 50.$$

Video Solution:

Q13 Text Solution:

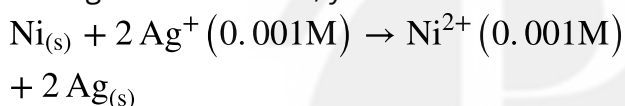
The metal placed below in electrochemical series does not react with that metal salt solution whose metal is placed above in electrochemical series.

Video Solution:**Q14 Text Solution:**

According to nernst equation

$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{2.303 RT}{nF} \log \frac{[\text{Anode}]^x}{[\text{Cathode}]^y}$$

From the given reaction, Ni acts as anode, $x=1$ and Ag acts as cathode, $y=2$



$$E_{\text{cell}} = 1.05 - \frac{0.059}{2} \log \frac{10^{-3}}{[10^{-3}]^2}$$

$$E_{\text{cell}} = 1.05 - \frac{0.059}{2} \log \frac{[10^{-3}]}{[10^{-3}][10^{-3}]}$$

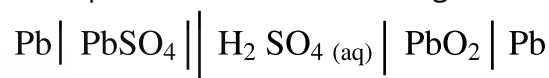
$$E_{\text{cell}} = 1.05 - \frac{0.059 \times 3}{2} = 0.9615\text{V}$$

Video Solution:**Q15 Text Solution:**

Degree of dissociation of weak electrolyte increases upon dilution.

Video Solution:**Q16 Text Solution:**

Cell representation of lead storage battery is



The cathode consists of Pb and PbO₂

Video Solution:**Q17 Text Solution:**

$$\text{Eq. of H}_2 = \text{Eq. of Al} = \frac{4.5}{\frac{27}{3}} = 0.5$$

$$\therefore 1 \text{ eq. H}_2 = 11.2\text{L}$$

$$\therefore 0.5 \text{ eq. H}_2 = 5.6\text{L}$$

Video Solution:

Q18 Text Solution:

Galvanic cells use energy of combustion of fuel like H_2 , as the source which produces electronic energy and are called fuel cells.

Video Solution:**Q19 Text Solution:**

1 mole Mn_3O_4 lose $(6 - \frac{8}{3}) \times 3 = 10$ mole e^- ; so total charge required = $2 \times 10 \Rightarrow 20 F$.

Video Solution:**Q20 Text Solution:**

$$\kappa = \frac{\text{cell constant}}{R}$$

$$\therefore \text{Cell constant} = \kappa \times R$$

$$= 0.2768 \times 82.4$$

$$= 22.81 \text{ m}^{-1}$$

\therefore Specific conductance of K_2SO_4 ,

$$\kappa_{K_2SO_4} = \frac{22.81}{326} = 0.07 \Omega^{-1} \text{ m}^{-1}$$

Video Solution:**Q21 Text Solution:**

$$\text{Eq. of } H_2 = \text{Eq. of Al} = \frac{4.5}{\frac{27}{3}} = 0.5$$

$$\therefore 1 \text{ eq. } H_2 = 11.2 \text{ L}$$

$$\therefore 0.5 \text{ eq. } H_2 = 5.6 \text{ L}$$

Video Solution:**Q22 Text Solution:**

$$E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.0591}{2} \log \frac{[Cu^{2+}]}{[Ag^+]^2}$$

It is obvious from above expression that on doubling the concentration of Cu^{2+} , E_{cell} would decrease by small fraction.

Video Solution:**Q23 Text Solution:**

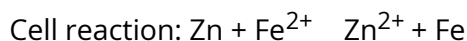
Mercury cell is primary cell as it cannot be recharged.

Nickel - cadmium cell is rechargeable and hence a secondary cell.

Video Solution:

Q24 Text Solution:

$$10^{\frac{0.32}{0.0295}}$$



Using Nernst equation

$$E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.0591}{n} \log \left[\frac{\text{Zn}^{2+}}{\text{Fe}^{2+}} \right]$$

$$E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.0591}{2} \log \frac{10^{-2}}{10^{-3}}$$

At 298 K, $E = 0.2905$

$$E^{\circ}_{\text{cell}} = 0.2905 + \frac{0.0591}{2} = 0.32$$

$$\text{or } 0.32 = \frac{0.0591}{2} \log K_{\text{eq}}$$

$$\text{or } K_{\text{eq}} = 10^{\frac{0.32}{0.0295}}$$

Video Solution:**Q25 Text Solution:**

Given, specific conductance,

$$k = 6.3 \times 10^{-2} \text{ ohm}^{-1} \text{ cm}^{-1}$$

HNO_3 concentration, $c = 0.1 \text{ M}$

Molar conductance

$$\Lambda_m = \frac{k \times 1000}{c} = 6.3 \times 10^{-2} \times \frac{1000}{0.1}$$

$$= 630 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$$

Video Solution:**Q26 Text Solution:**

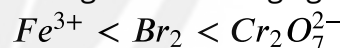
$$\Delta G^{\circ} = -nF E^{\circ}_{\text{cell}} = -2 \times 96500 \text{ C} \times 0.24 \text{ V} = -46.32 \text{ kJ/mol}$$

Video Solution:**Q27 Video Solution:****Q28 Text Solution:**

Since, the order of standard reduction potential is $E_1^{\circ} > E_2^{\circ} > E_3^{\circ}$

Higher the value of standard reduction potential, higher is the ease to get reduced.

The species which readily gets reduced, is a better oxidising agent. Thus, the order of strength of oxidising agent is

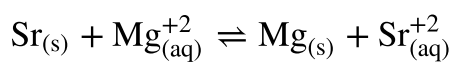
**Video Solution:****Q29 Text Solution:**

$E^{\circ}_{\text{Zn}^{2+}/\text{Zn}}$ is most negative.

Video Solution:

Q30 Text Solution:**(2)**

The reaction is



$$K_C = 2 \times 10^2$$

at equilibrium $E = 0$, $Q = K_C$

$$\Rightarrow 0 = E^\circ - \frac{0.0591}{2} \log k_C$$

$$\Rightarrow E^\circ = \frac{0.0591}{2} \log 2 \times 10^2$$

$$= 0.0679 \text{ V}$$

(NEW NCERT 12th Part-I Page No. 39)**Video Solution:**[Android App](#)[iOS App](#)[PW Website](#)