YAKEEN NEET 2.0

2026

Electrochemistry

Physical Chemistry | Lecture -9

By- Amit Mahajan Sir

Topics to be covered

1. MEDICS TEST, Revision of Last Class
2. Faradays laws of electrolysis
3. ~~Electrolytic cells~~ Conductance
4. MPQ, Home work from modules

Rule 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.

Rule 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 !!!

MEDICS

Mastery
Checks your grasp over NEET-level concepts

Evaluation
Judging both knowledge and test-smartness

Decision Making
Testing your speed + accuracy under pressure

Intuition
Some answers need gut + logic – can you spot the trick?

Concepts
It's all about strong basics – no shortcuts here

Strategy
The MEDICS test – built for those who heal, hustle, and hope.

Question

The metal that cannot be obtained on reduction of its oxide by aluminium is

$Al + \text{Metal oxide} \rightarrow \text{Metal} + Al_2O_3$

S.R.P. high

A. K

B. Mn

C. Cr

D. Fe

Question

Beryllium is placed above magnesium in the group II. Beryllium dust, therefore, when added to $MgCl_2$ solution will

(A) have no effect

(B) precipitate Mg metal

(C) precipitate MgO

(D) lead to dissolution of Be metal

Question

In salt bridge, normally KCl is used because

A it is a strong electrolyte.

B it is good conductor of electricity.

C K^+ and Cl^- ions have nearly same ionic mobility.

D it is an ionic compound.

Question

By how much would the oxidizing power of MnO_4^-/Mn^{2+} couple change if the H^+ ions concentration is decreased 100 times at 25°C?

(A) increases by 189 mV

(B) decreases by 189 mV

(C) will increase by 19 mV

(D) will decrease by 19 mV

$$1\,MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{2+} + 4H_2O$$

1 M 1 M 1 M

1 M 0.01 M 1 M

$$E = E^0 - \frac{0.06}{5}\log\frac{1}{1\times(0.01)^8}$$

$$E_1 = E^0$$

$$E_2 = E^0 - \frac{0.06}{5} \log \frac{1}{(1)^1 (10^{-2})^8}$$

$$= E_1^0 - \frac{0.012}{} \log 10^{16}$$

$$E_2 - E_1^0 = -0.012 \times 16 \times 1000\ mV$$

$$\approx -192\ mV$$

Question

The solution of $CuSO_4$, in which copper rod is immersed, is diluted to 10 times. The reduction electrode potential

$Cu^{2+} + 2e^- \rightarrow Cu$

1M, 0.1

$E = E^\circ + \frac{0.06}{2} \log [Cu^{2+}]$

$E_1 = E^\circ + 0.03 \log 1$

$E_1 = E^\circ$

$E_2 = E_1 + 0.03 \log 10^{-1}$

$E_2 - E_1 = -0.03\ V$

(A) increases by 0.0295 V

(B) decreases by 0.0295 V

(C) increases by 0.059 V

(D) decreases by 0.059 V

Question

For the electrochemical cell, $M^{o} \mid M^{+} \parallel X^{-} \mid X^{o}$; $E^{o}_{M^{+}/M} = 0.44$ V and $E^{o}_{X/X^{-}} = 0.33$V . From this data, one can deduce that

$E^{o}_{cell} = 0.44 - (0.33)$

$= 0.11$ V

(A) $M + X \longrightarrow M^{+} + X^{-}$ is the spontaneous reaction

(B) $M^{+} + X^{-} \longrightarrow M + X$ is the spontaneous reaction

(C) $E_{cell} = 0.77V$

(D) $E_{cell} = -0.77V$

Question

The EMF of the cell: Zn | Zn^{2+} (0.01M) || Fe^{2+} (0.001 M) | Fe at 298 K is 0.2905 V, then the value of equilibrium constant for the cell reaction is

(A) $e^{\frac{0.32}{0.0295}}$

(B) $10^{\frac{0.32}{0.0295}}$

(C) $10^{\frac{0.26}{0.0295}}$

(D) $10^{\frac{0.32}{0.0591}}$

$E_{cell} = 0.2905\ V$

$K = ?$

$E_{cell} = E^{\circ}_{cell} + 2.303\,RT \log \frac{10^{-2}}{10^{-3}}$

$0.2905 = E^{\circ}_{cell} + 2.303RT \log 10$

$0.2905 - 2.303RT = E^{\circ}_{cell}$

$$\Delta G^\circ = +nFE^\circ = +2.303RT \log K.$$

$$0.2905 - 2.303RT = \frac{2.303RT}{nF} \log K.$$

$$0.2905 - 2.303RT = \frac{0.0295}{2} \log K$$

$$\text{antilog}\left(\frac{0.2905 - 2.303 \times 8.314 \times 298}{0.0295}\right) = K$$

$$\frac{6.2905 - 5705.8}{0.0295}$$

Question

A depolarizer used in dry cell batteries is

→ Oxid. agent

(A) NH_4Cl

(B) MnO_2

(C) KOH

(D) Na_3PO_4

Question

Which is correct about fuel cells?

(A) Cell continuously run as long as fuels are supplied.

(B) These are more efficient and free from pollution.

(C) These are used to provide power and drinking water to astronauts in space programme.

(D) All of these

Question

When a lead storage battery is discharged

A SO_2 is evolved

B lead sulphate is consumed

C lead is formed

D sulphuric acid is consumed

Revision of Last Class

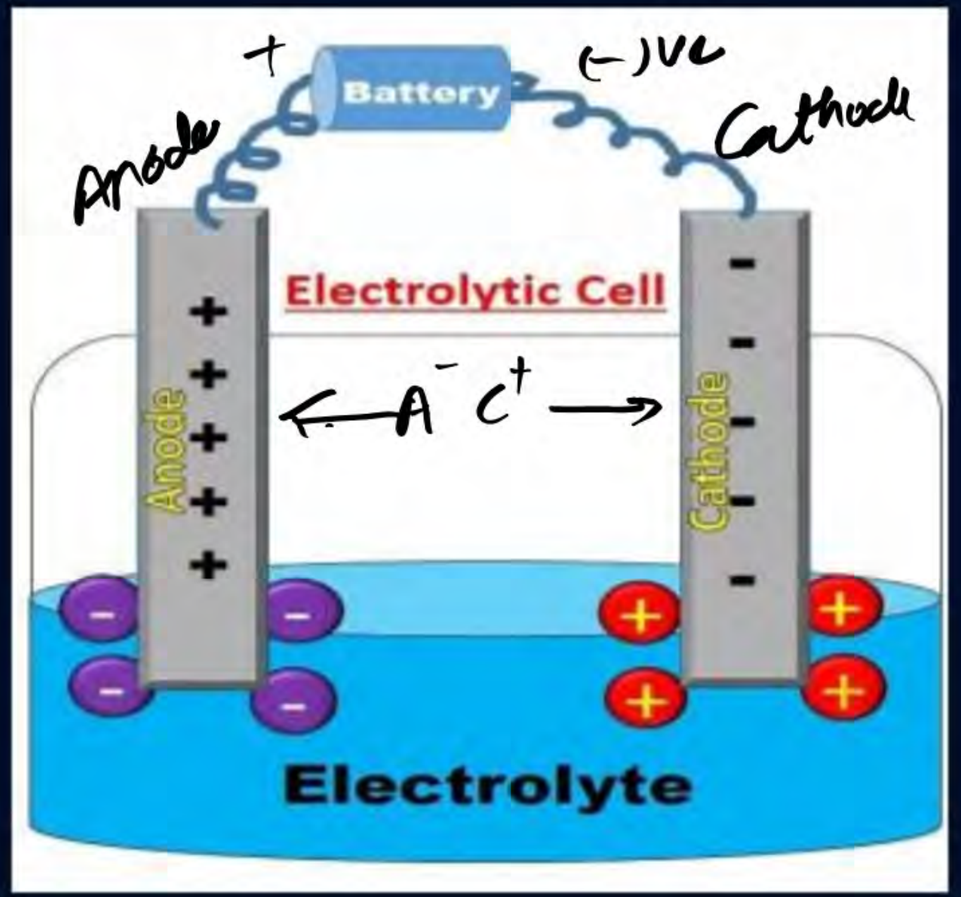
Electrolysis :-

S.R.P ↑ D.P.↓ discharge Cathode.

S.O.P ↑ D.P.V ——— anode

Except Cl^- & OH^-

$S_u N O_u$ or in $C B I$



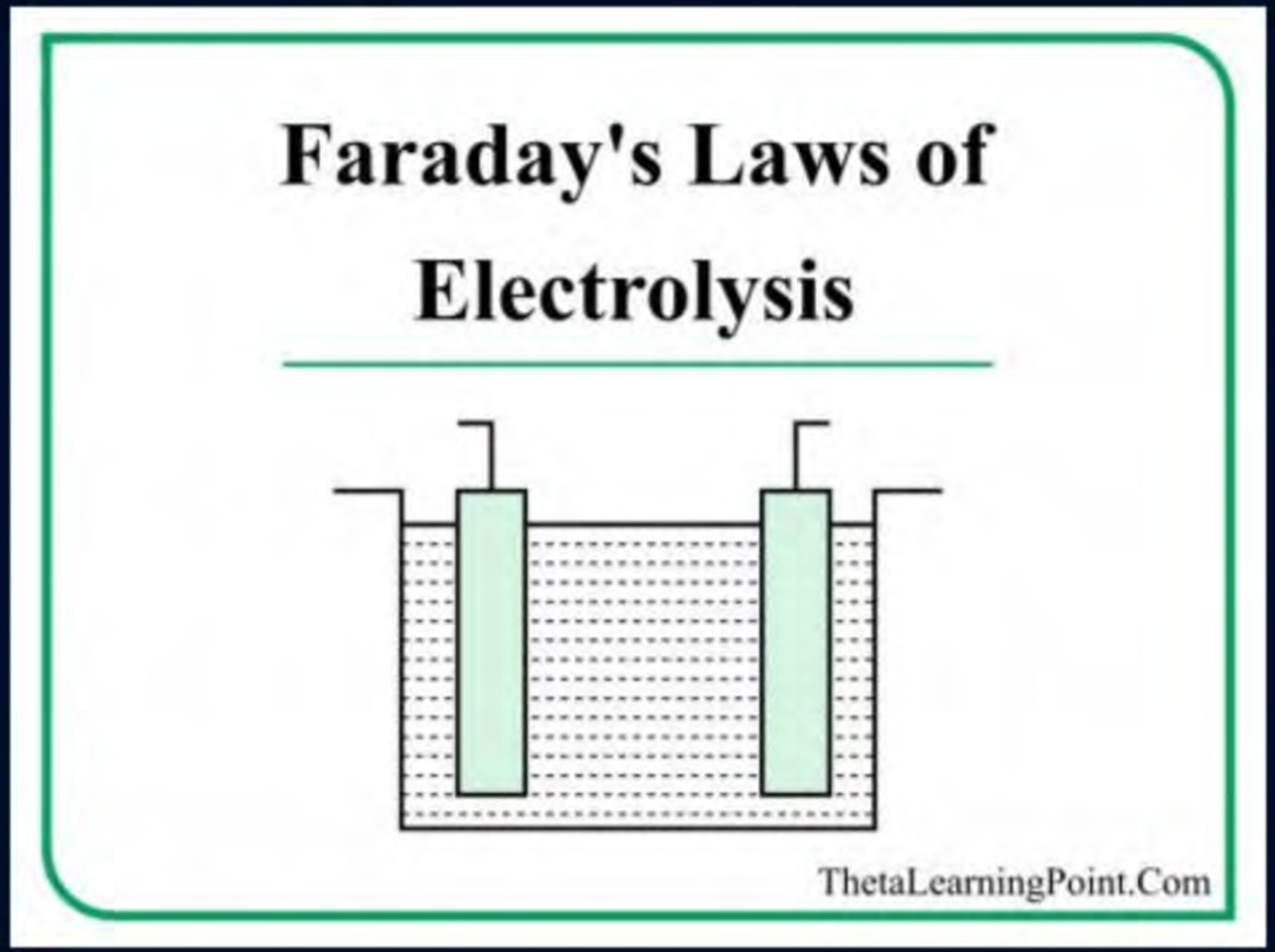
Faraday's First Law of Electrolysis

$m \propto q$

$m = Z\,q$

$m = \frac{\text{eq. wt.}}{F}\,q$ ($q \rightarrow It$, $q \rightarrow ne^-$)

$= \frac{G.M.M.\ I\,t}{n\ F}$



JEE MAIN

① $m = Zq$

$Z = \frac{\text{eq. wt.}}{F} = \frac{\text{G.M.M.}}{n\ F}$

Z ↓ electrochemical eq.

n ↓ e^- lost or gained.

$q = It$

$q = \frac{ne^-}{\downarrow}$ no. of e^-

$m = \frac{\text{G.M.M.}}{n\ F} It$ ✓

I = Current in A

t = time in s

$F \approx 96500\ C$

m = mass deposit

② 1 g.eq. deposit = 1 F

1 mole deposit = n F

③ 1 F is equal to Charge of 1 mole of e^-

$\frac{m}{E} = \frac{q}{F}$

g.eq. $= \frac{q}{F}$

$1 = \frac{q}{F} \Rightarrow q = F$

1 g.eq. deposit → 1 g H_2 ✓

1 g.eq. deposit → 8 g O_2 ✓

1 g.eq. deposit → 23 g Na

1 g.eq. deposit → 35.5 g Cl_2

1 g.eq. deposit → 20 g Ca ✓

1 g.eq. deposit → 108 g Ag

$$\frac{m}{E} = \frac{q}{F}$$

$$\frac{m}{G \cdot M \cdot M} \times n = \frac{q}{F}$$

$$\text{moles} \times n = \frac{q}{F}$$

1 mole

$$q = nF$$

Avogadro's no. $= 6.022 \times 10^{23}$

1 e^- Charge $= 1.6 \times 10^{-19}$ C.

1 mole e^- $= 1.6 \times 10^{-19} \times 6.022 \times 10^{23}$

≈ 96500 C.

QUESTION-(NEET 2024)

Match List-I with List-II.

(A) A-II, B-IV, C-I, D-III

(B) A-III, B-IV, C-I, D-II

(C) A-II, B-III, C-I, D-IV

(D) A-III, B-IV, C-II, D-I

List – I (Conversion)	List – II (Number of Faraday required)
(A) 1 mol of H_2O to O_2	(I) 3F
(B) 1 mol of MnO_4^- to Mn^{2+}	(II) 2F
(C) 1.5 mole of Ca from molten $CaCl_2$	(III) 1F
(D) 1 mole of FeO to Fe_2O_3	(IV) 5F

QUESTION [NEET 2013]

= 38586

How many grams of cobalt metal will be deposited when a solution of cobalt (II) chloride is electrolyzed with a current of 10 amperes for 109 minutes? (1 faraday = 96,500 C; Atomic mass of Co = 59u)

$m_{Co} = ?$, $I = 10A$, $t = 109\ min. = 109 \times 60$

$Co^{+2}Cl_2 \xrightarrow{n=2} Co^{0}$

$$m_{Co} = \frac{59 \times 10 \times 109 \times 60}{2 \times 96500} = 20$$

98 + 9

3.

(A) 4.0

(B) 20.0 ✓

(C) 40.0

(D) 0.66

QUESTION-(NEET 2024)

$Cu^{+2}SO_4 \rightarrow Cu^0$

$n = 2$

Mass in grams of copper deposited by passing 9.6487 A current through a voltmeter containing copper sulphate solution for 100 seconds is:
(Given: Molar mass of Cu : 63 g mol^{-1}, 1F = 96487 C)

$$m_{Cu} = \frac{31.5 \times 9.6487 \times 100}{2 \times 96487 \times 10000}$$

$= 0.315\,g$

(A) 3.15 g

(B) 0.315 g

(C) 31.5 g

(D) 0.0315 g

QUESTION [AIIMS 2008]

During electrolysis of water, the volume of O_2 liberated is 2.24 dm^3. The volume of hydrogen liberated under same conditions will be:

(A) 2.24 dm^3

(B) 1.12 dm^3

(C) 4.48 dm^3

(D) 0.53 dm^3

$2H_2O(l) \longrightarrow 2H_2(g) + 1O_2(g)$

$2L \quad 1L$

$2 \times 2.24L \quad 2.24L$

$= 4.48L$

$V_{O_2} = 2.24L$

$V_{H_2} = ?$

QUESTION

Electrolysis can be used to determine atomic masses. A current of 0.550 A deposits 0.55 g of a certain metal in 100 minutes. Calculate the atomic mass of the metal if eq. mass = mol. Mass/3.

A 100

B 45.0

C 48.25

D 144.75

$$m = \frac{G.A.M \times I \times t}{n \times F}$$

$$0.55 = \frac{G.A.M \times 0.55 \times 100 \times 60}{3 \times 96500}$$

$$G.A.M = \frac{965}{20}$$

QUESTION [NEET – Phase-II-2016]

Number of electrons delivered at cathode during electrolysis of 1 ampere in 60 seconds is:

(A) 6×10^{23}

(B) 6×10^{20}

(C) 3.75×10^{20}

(D) 7.48×10^{23}

no. of $e^- = n$ $\quad I = 1\,A,\ t = 60\,sec.$

$q = ne = It$

$n \times 1.6 \times 10^{-19} = 1 \times 60$

$n = \frac{60 \times 10^{20}}{1.6}$

$= 3.75 \times 10^{20}$

QUESTION

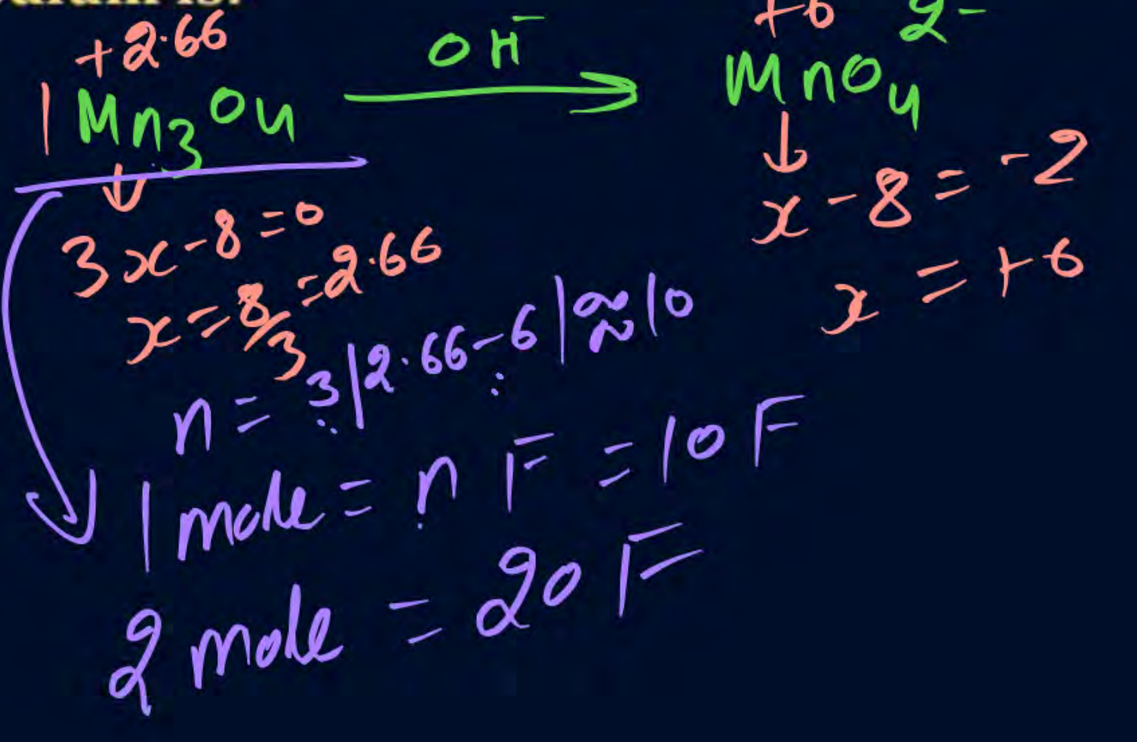
Total charge required for the oxidation of two moles Mn_3O_4 into MnO_4^{2-} in presence of alkaline medium is:

(A) 5F

(B) 10F

(C) 20F

(D) None of these



QUESTION

$M^{3+} + 3e^- \longrightarrow M^0$

$n = 3$

One gm metal M^{3+} was discharged by the passage of 1.81×10^{23} electrons. What is the atomic weight of metal?

A. 33.35

B. 133.4

C. 66.7

D. None of these

$m = \frac{G.A.M. \times \text{no. of } e^- \times e^-}{n \times F}$

$1 = \frac{G.A.M. \times 1.81 \times 10^{23} \times 1.6 \times 10^{-19}}{3 \times 96500}$ ≈ 10

$G.A.M. = \frac{3 \times 9650}{181 \times 16} = \frac{28950}{2896}$

$\frac{3 \times 9650}{181 \times 16}$

Q. quantity of silver deposit when 1 C of charge is passed through $AgNO_3$ soln

$Ag^{+1}NO_3 \rightarrow Ag$ $\quad n=1$

(a) ✗ 0.1 g atom of Ag

(b) ✗ 1 Chemical eq. of Ag.

(c) ✗ 1 g. of Ag

(d) ✓ 1 electrochemical eq. of silver

1 F → 1 eq.

$q = 1\,C$

$n = 1$

$$m = \frac{G.A.M \times q}{n \times F}$$

$$m = \frac{2}{1}\,q$$

$q = 1$

$$m = z = \frac{108}{1 \times 96500}$$

Q. 1 F of electricity will liberates $x \times 10^{-1}$ g atom of Copper from $CuSO_4$, x is

$$1F = 1 g\cdot eq. = \frac{mass}{Eq.\ mass} = \frac{mass}{Gr.\ A.M.} \times n =$$

$$1 = g\cdot atom \times n$$

$$\frac{31.5}{31.5} = x \times 10^{-1} \times 2$$

$$x = \frac{10}{2} = 5$$

$$g\ atom = \frac{mass}{Gr.\ A.M.}$$

$Cu^{+2} \xrightarrow{n=2} Cu$

$$E = \frac{63.5}{2} = 31.5\ g$$

Q Metal surface $100 cm^2$ area has to Coated with Nickel layer of thickness 0.001 mm. Current 2A through sol^n of $Ni(NO_3)_2$ for x sec. find x. Ans

density $_{Ni}$ = 10 g/ml

G.A.M of Ni = 60 g/mol

F = 96500 C

$Ni(NO_3)_2 \xrightarrow{n=2} Ni^0$ (Ni^{+2})

V_{Ni} = area × thickness

$= \frac{10 \times 0.0001}{10 \times 1000} = 10^{-6} cm^3$

I = 2 A

t = x

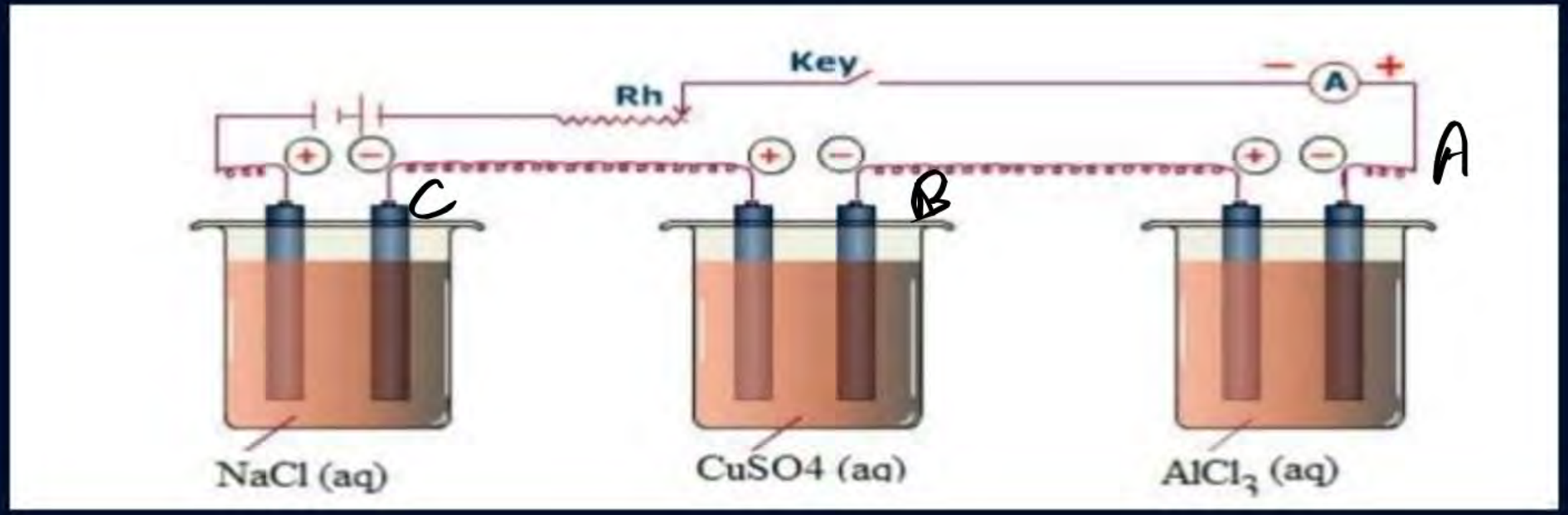
$m = \frac{G.A.M \times I \times t}{n \times F}$

$10^{-6} \times 10 = \frac{60 \times 2 \times t}{2 \times 96500}$

$t = \frac{965}{6} \simeq 161$ sec.

Faraday's Second Law of Electrolysis

2 or more Cells Connected in series ⇒ Charge same pass ⇒ g_{eq} deposit same.



$g_{eq_A} = g_{eq_B} = g_{eq_C}$

$$\frac{W_A}{E_A} = \frac{W_B}{E_B} = \frac{W_C}{E_C}$$

QUESTION

If $CuSO_4(aq)$ and $AgNO_3(aq)$ are connected in series and mass of Cu deposited is 127 g, find mass of Ag deposited (Atomic mass of Cu = 63.5g; Ag = 108 g)

$Cu^{+2} \xrightarrow{n=2} Cu$

$Ag^{+1} \xrightarrow{n=1} Ag$

Ans $\quad g\,eq\,Ag = g\,eq\,Cu$

$$\frac{w_{Ag}}{E_{Ag}} = \frac{w_{Cu}}{E_{Cu}}$$

$$\frac{w_{Ag}}{\frac{108}{1}} = \frac{127}{\frac{63.5}{2}}$$

$$w_{Ag} = 432\,g$$

Conductors

- **Which can conduct electricity**

For Ex.: **Cu(s), Ag(s), aq. Na^+Cl^-**

Type of Conductors

- There are two types
  (a) Metallic Conductors
  (b) Electrolytic Conductors

Metallic Conductors

- Metals → Cu(s), Ag(s)

Electricity is conducted by electrons

$Cu(s) \longrightarrow Cu^{2+} + 2e^-$

$Cu(s) \longrightarrow Cu^{+} + 1e^-$

$Na(s) \longrightarrow Na^{+} + 1e^-$

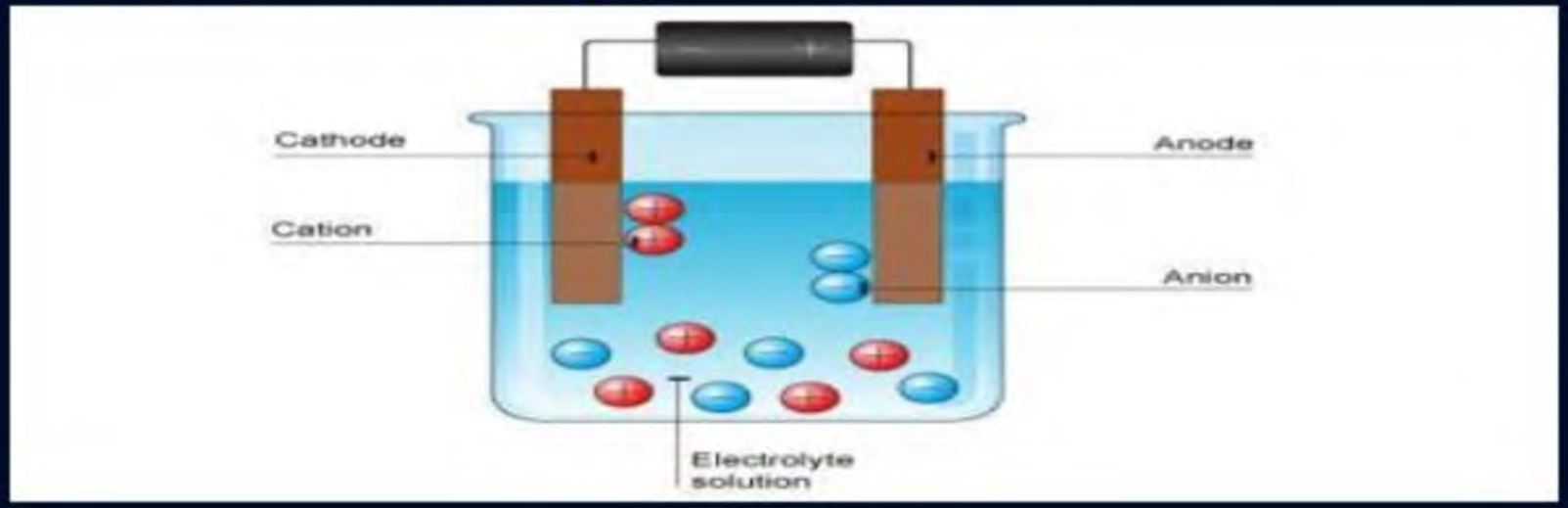
$Ca(s) \longrightarrow Ca^{2+} + 2e^-$

Electrolytic Conductors

- **Electrolytes in aq. solution or molten state.**

For Ex.: aq. NaCl, aq. Na_2SO_4 etc.

But in solid they do not conduct electricity movement of ions is main reason for conductivity



- NaCl(s) do not conduct electricity as due to strong ionic bond they are not free to move.

Types of Electrolytic Conductors

- **Strong Electrolytes: $\alpha = 1$**

  Fully dissociate in water

For Ex.: Na^+Cl^-, Na_2SO_4

- **Weak Electrolyte: $\alpha < 1$**

  They do not dissociate completely in water.

For Ex. CH_3COOH, HCOOH etc

Metallic Conductors	Electrolytic Conductors
1. No mass flow	1. Mass flow
2. Only physical changes occur $Ag \longrightarrow Ag^{+} + 1e^{-}$	2. Both physical and chemical changes occure aq. $Na^{+}Cl \rightarrow$ electrolysis done after electrolysis H_2, Cl_2 released and aq. NaOH.
3. Conducting power $\propto$ 1/Temperature	3. Conducting power $\propto$ Temperature
4. Faraday's laws not followed	4. Faraday's laws are followed

Electrolytic Conductors Factors Affecting Conductivity

Solute-solute Interaction

- If solute-solute interaction is high, they are not free to move

$\therefore$ Electrical conductivity is low.

Solvent-solvent Interaction

- If viscosity of solvent is high lesser is the conductivity of solution.

For Ex.: Honey has higher viscosity than water

$\therefore$ Electrolytic conductance of solute in Honey is quite less.

Solute-solvent Interaction

- $NaCl(s) + H_2O \longrightarrow Na^+(aq) + Cl^-(aq)$

Solute-solvent Interaction

Li^+

Na^+

K^+

Rb^+

Cs^+

Hydration max

Top to bottom size increase

$\therefore$ Hydration decreases

Grothus Dopper Mechanism

- **Grothus Dopper Mechanism or Jumping Mechanism:-** Due to jumping mechanism, H^+ has highest ionic mobility followed by OH^- ion's ionic mobility

Concentration

- **Strong Electrolyte:-** As concentration increases number of ions increases and electrical conductance increases

For Ex.: Na^+Cl^-

Concentration

- **Weak Electrolyte:-**

Temperature

- **Temperature increase:-** Electrical conductivity increase for electrolytic conductors.

QUESTION (NEET 2017)

Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field?

(A) K

(B) Rb

(C) Li

(D) Na

Resistance (R)

- **Unit: Ohm or Ω**

9 lines

Conductance (G or C)

2 lines

Specific Resistance Or Resistivity (ρ)

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Specific Conductance Or Conductivity (κ)

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Molar Conductivity (Λ_M)

- Current of all the ions when 1 mole electrolyte dissolved in V ml of solution.

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Equivalent Conductivity ($\Lambda_{eq.}$ or Λ_N)

- Current of all ions when 1 gram eq. of electrolyte is dissolved in V. ml of solution.

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Magarmach Practice Questions

QUESTION [NEET 2020]

The number of Faradays (F) required to produce 20 g of calcium from molten $CaCl_2$ (Atomic mass of Ca = 40 g mol^{-1}) is:

A 2

B 3

C 4

D 1

QUESTION-(NEET 2016-II)

During the electrolysis of molten sodium chloride, the time required to produce 0.10 mol of chlorine gas using a current of 3 amperes is:

(A) 220 minutes

(B) 330 minutes

(C) 55 minutes

(D) 110 minutes

QUESTION-(NEET 2016-II)

The number of electrons delivered at the cathode during electrolysis by a current of 1 ampere in 60 seconds is: (charge on electron = 1.60×10^{-19} C)

A 3.75×10^{20}

B 7.48×10^{23}

C 6×10^{23}

D 6×10^{20}

QUESTION-(NEET 2014)

When 0.1 mol MnO_4^{2-} is oxidized, the quantity of electricity required to completely oxidize MnO_4^{2-} to MnO_4^{-} is:

A 96500 C

B 2×96500 C

C 9650 C

D 96.50 C

QUESTION – (NEET 2014)

The weight of silver (at wt. = 108) displaced by a quantity of electricity which displaces 5600 mL of O_2 at STP will be:

(A) 5.4 g

(B) 10.8 g

(C) 54.9 g

(D) 108.0 g

QUESTION – (AIIMS 2004)

Time required to deposit one millimole of aluminium metal by the passage of 9.65 amperes through aqueous solution of aluminium ion is:

A) 30 s

B) 10 s

C) 30,000 s

D) 10,000 s

QUESTION – (AIIMS 2000)

For reducing one mole of $Cr_2O_7^{2-}$ to Cr^{3+} the charge required:

(A) 3×96500 coulomb

(B) 6×96500 coulomb

(C) 0.3 Faradays

(D) 0.6 Faradays

QUESTION – (AIIMS 2018 (E), 27 May)

Time taken to completely (in hrs) decompose 36 g water by passing 3A current is:

(A) 35.8 hrs

(B) 40 hrs

(C) 51.8 hrs

(D) 22.5 hrs

QUESTION –

How many minutes will it take to plane out 5. g of Cr from a $Cr_2(SO_4)_3$ solution using a current of 9.65 A? (Atomic mass : Cr = 52.0)

A 200

B 50

C 100

D 103

QUESTION – (JEE MAINS 25th June 2nd Shift-2022)

A solution of $Fe_2(SO_4)_3$ is electrolysed for 'x' min with a current of 1.5 A to deposit 0.3482 g of Fe. The value of x is _____. (Nearest Integer)

(Given: 1F = 96500 C mol^{-1}; Atomic mass of Fe = 56 g mol^{-1})

QUESTION – (JEE MAINS 29th June 1st Shift-2022)

A dilute solution of sulphuric acid is electrolysed using a current of 0.10 A for 2 hours to produce hydrogen and oxygen gas. The total volume of gases produced at STP is _____ cm^3. (Nearest integer)

[Given: Faraday constant, F = 96500 C mol^{-1} at STP, molar volume of an ideal gas is 22.7 L mol^{-1}]

QUESTION – (JEE MAINS 20th July 2nd Shift-2022)

Potassium chlorate is prepared by electrolysis of KCl in basic solution as shown by following equation.

$$6OH^- + Cl^- \longrightarrow ClO_3^- + 3H_2O + 6e^-$$

A current of x A has to be passed for 10 h to produce 10.0 g of potassium chlorate. The value of x is _____. (Nearest integer)

(Molar mass of $KClO_3$ = 122.6 g mol^{-1}, F = 96500 C)

Attention: Yakeen NEET 2026 Batch

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Home work from modules

Prarambh → Q 62 to Q 76

Prabal → Q 12, 13, 25

PYQ → Q 1, 2, 9, 10, 19, 23

THANK YOU