YAKEEN NEET 2.0

2026

Electrochemistry

Physical Chemistry | Lecture -8

By- Amit Mahajan Sir

Topics to be covered

1. Revision of Last Class
2. Electrolysis & electrolytic cell
3. Faradays laws
4. MPQ, Home work from modules

Some basic Concepts of Chemistry ✓

Redox rx^n & Vol. analysis ✓

Solutions ✓

Thermodynamics & Thermochem.

Chemical & ionic eq.

Electrochem. → Lec 1 to Lec-8 → Tomorrow.

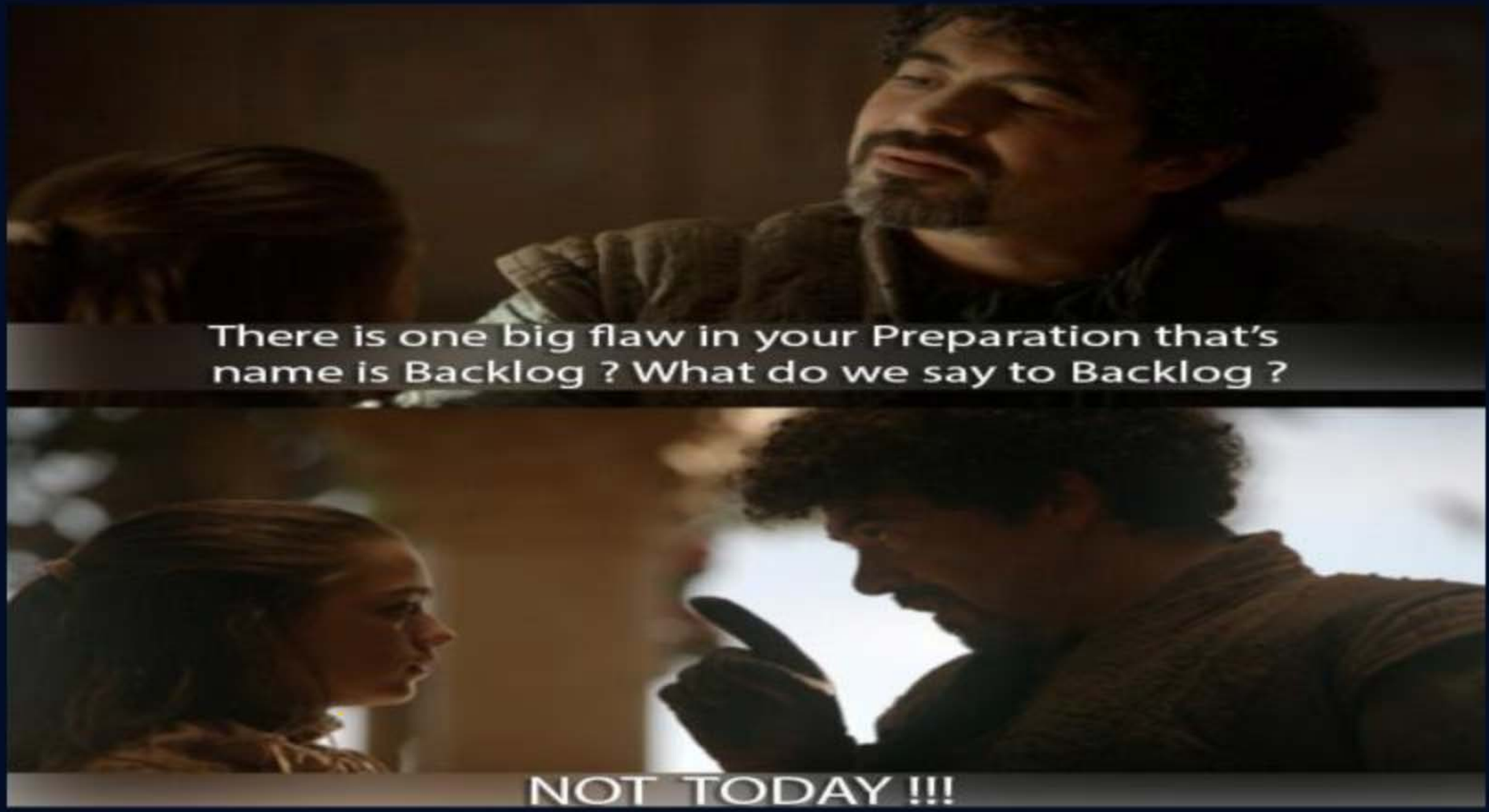
→ 24th August

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 !!!

Question

For the Daniell cell, chemical reaction is

$$Zn(s) + Cu^{2+}(aq) \longrightarrow Zn^{2+}(aq) + Cu(s)$$

$E^\circ = 1.1V$ at 298 K. Also given°

Species	ΔG°_{298} (formation)
Zn(s)	0.00
$Zn^{2+}(aq)$	$-146 kJ\ mol^{-1}$
Cu(s)	0.00

Thus, $E^o_{Cu/Cu^{2+}}$ at 298 K is ..... .

$n = 2$

$E^\circ_{cell} = E^\circ_{Cu^{2+}/Cu} - E^\circ_{Zn^{2+}/Zn}$

$1.1 = E^\circ_{Cu^{2+}/Cu} - (-0.76)$

$1.1 - 0.76 = E^\circ_{Cu^{2+}/Cu} = 0.34V$

$E^\circ_{Cu/Cu^{2+}} = -0.34\ V$

$\Delta G^\circ_{Zn/Zn^{2+}} = -nFE^\circ_{Zn/Zn^{2+}}$

$+146000 = +2 \times 96500\, E^\circ_{Zn/Zn^{2+}}$

$E^\circ_{Zn/Zn^{2+}} = \frac{1460}{1930} = 0.76V$

$\Rightarrow E^\circ_{Zn^{2+}/Zn} = -0.76$

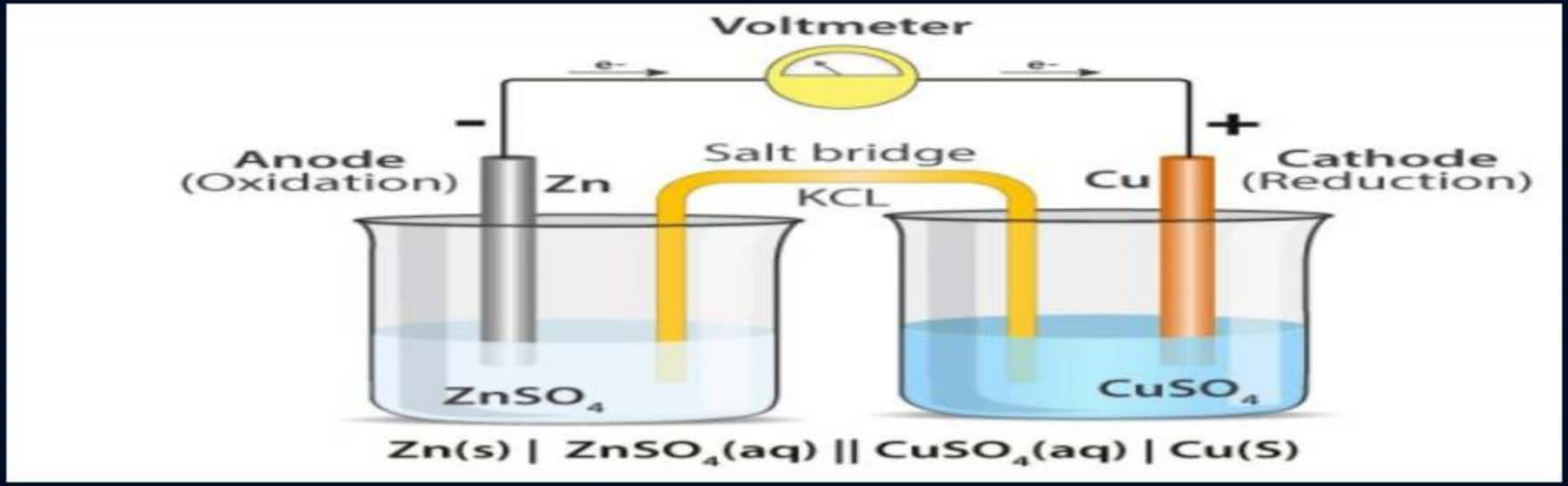
(A) 0.76 V

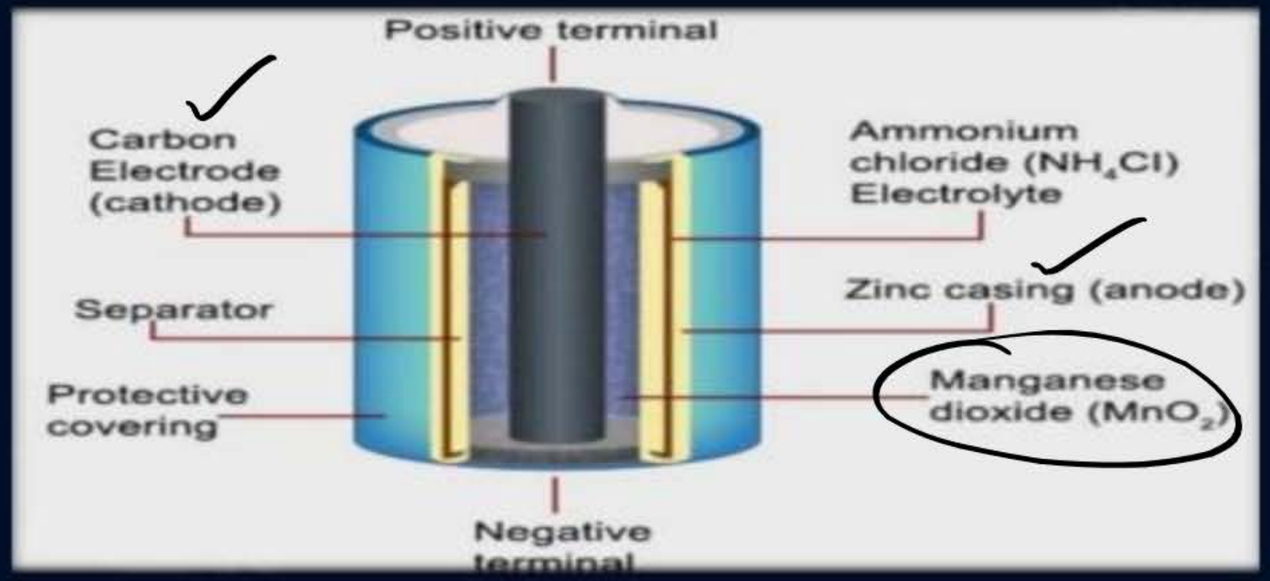
(B) 0.34 V

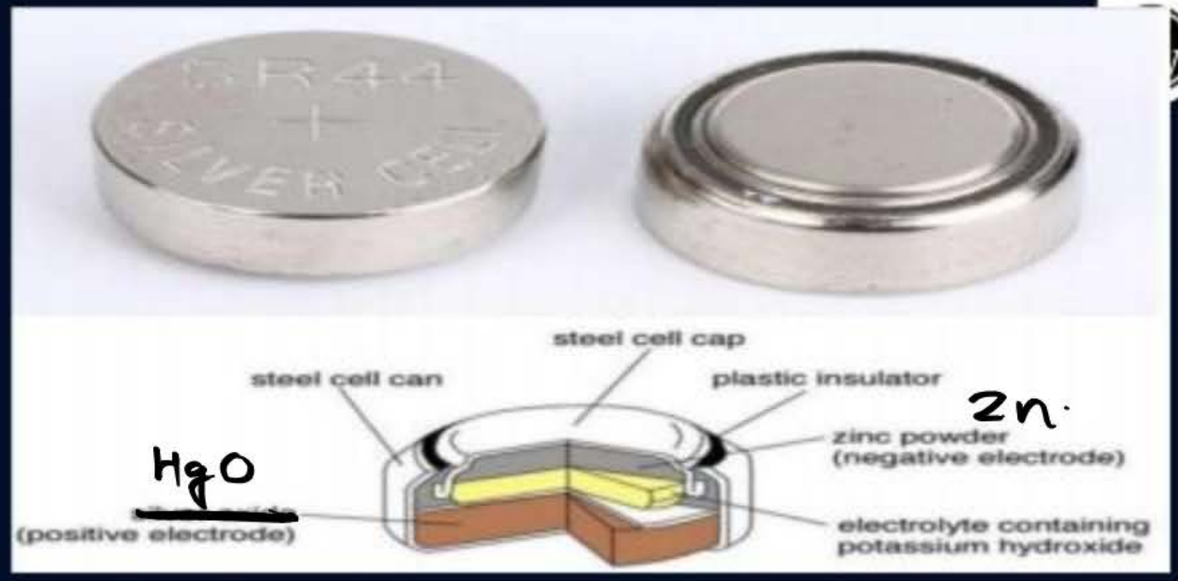
(C) −0.34 V

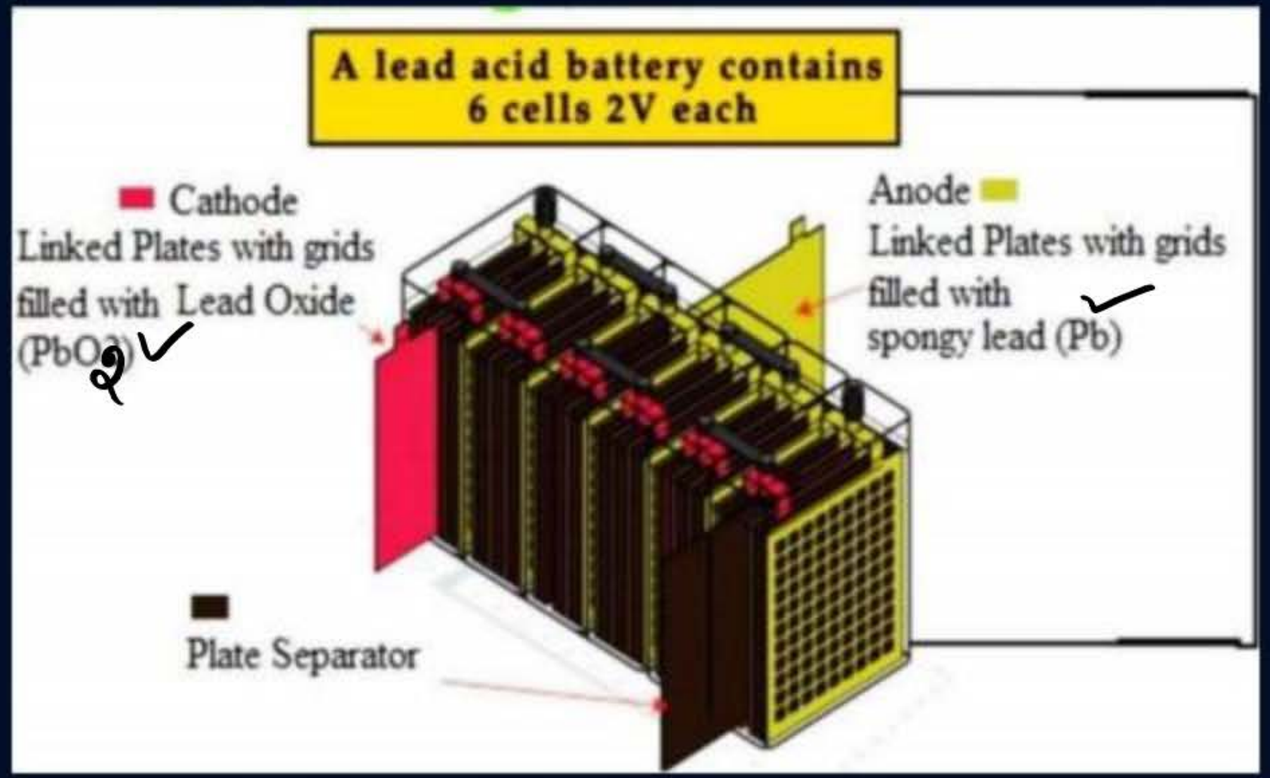
(D) −0.76 V

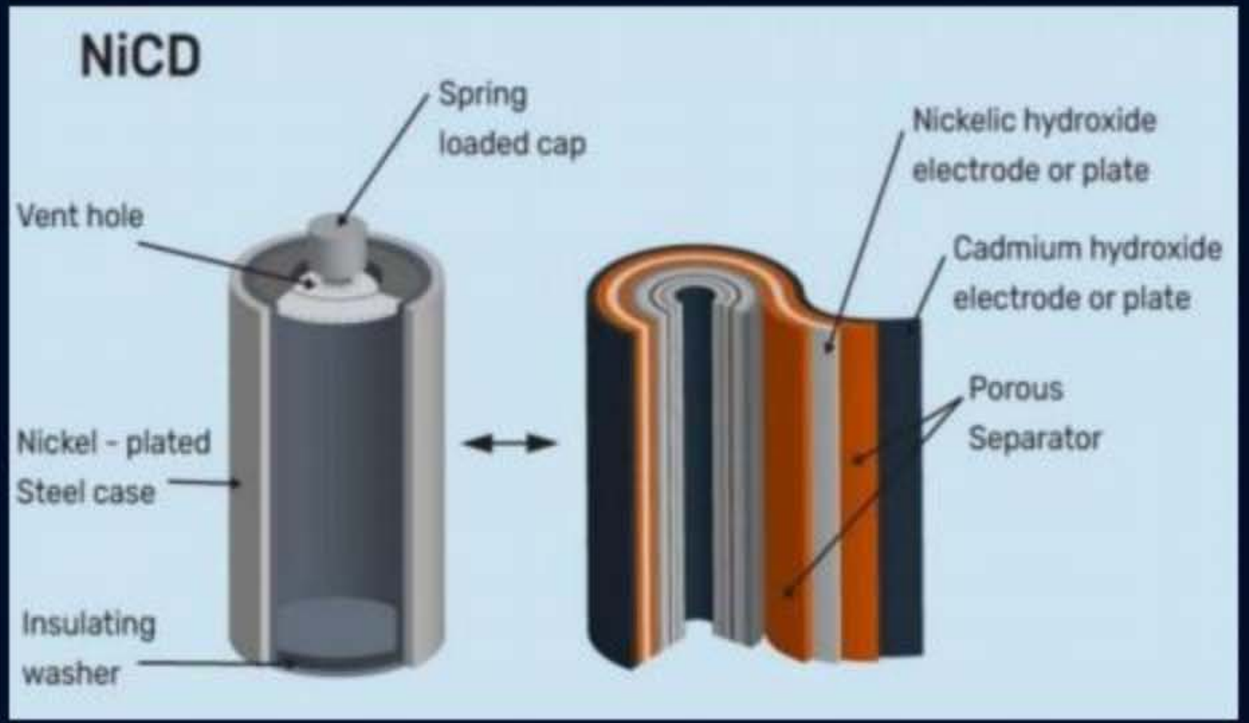
Revision of Last Class

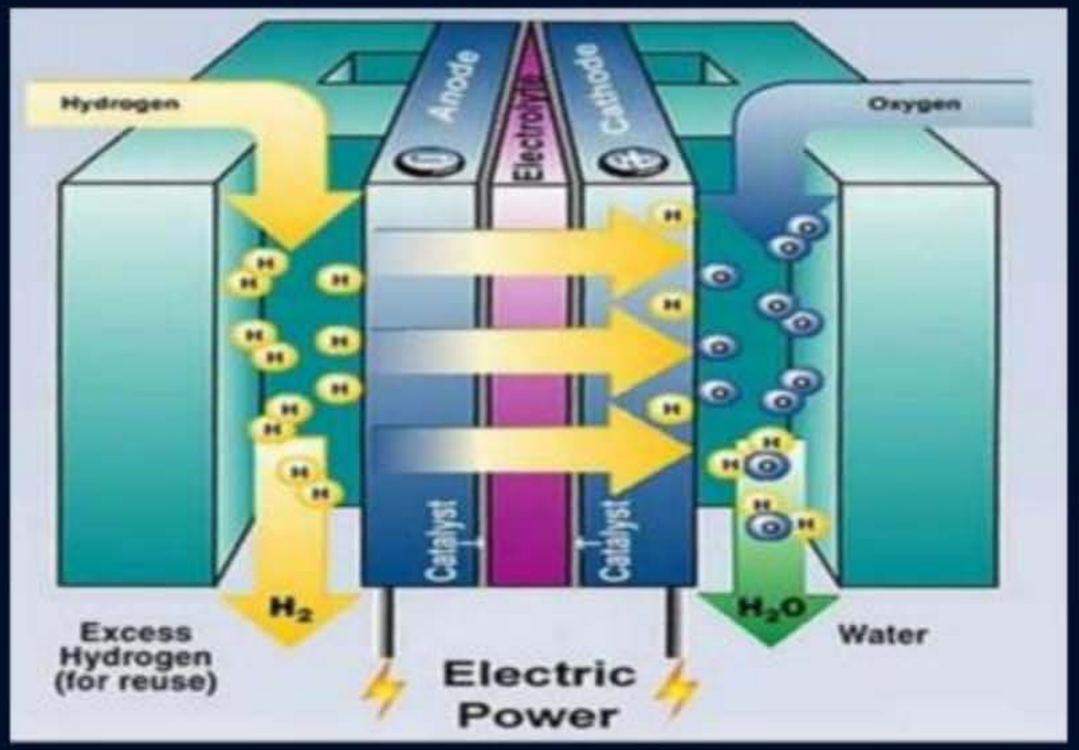



Positive terminal
Carbon Electrode (cathode)
Ammonium chloride (NH_4Cl) Electrolyte
Zinc casing (anode)
Separator
Manganese dioxide (MnO_2)
Protective covering
Negative terminal


steel cell cap
steel cell can
plastic insulator
zinc powder (negative electrode)
HgO
(positive electrode)
electrolyte containing potassium hydroxide


A lead acid battery contains 6 cells 2V each
Cathode
Linked Plates with grids filled with Lead Oxide (PbO_2)
Anode
Linked Plates with grids filled with spongy lead (Pb)
Plate Separator


NiCD
Spring loaded cap
Vent hole
Nickelic hydroxide electrode or plate
Cadmium hydroxide electrode or plate
Porous Separator
Nickel - plated Steel case
Insulating washer



H_2 - O_2 fuel cell

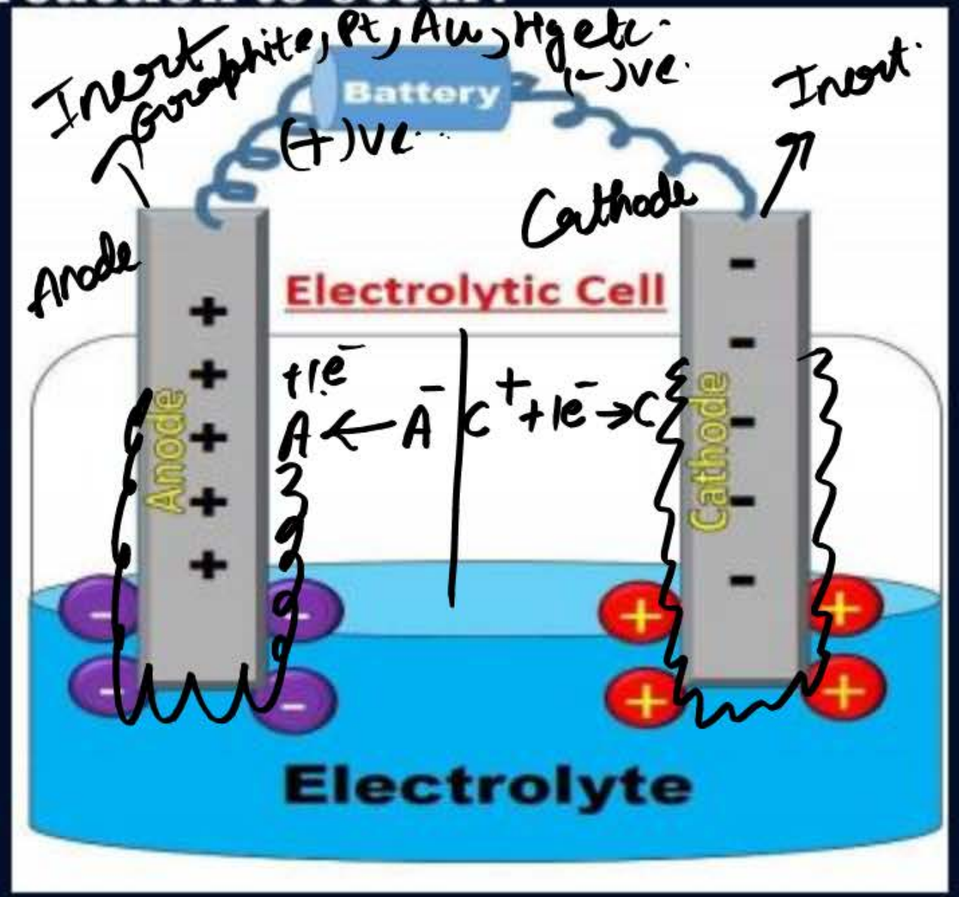
$2H_{2(g)} + 1O_2 \rightarrow 2H_2O$

CH_4 - O_2 fuel cell

$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$

Electrolysis

Process in which electricity is used for chemical reaction to occur:



Electrolytic Cell

Cell in which electrical energy is converted into chemical energy

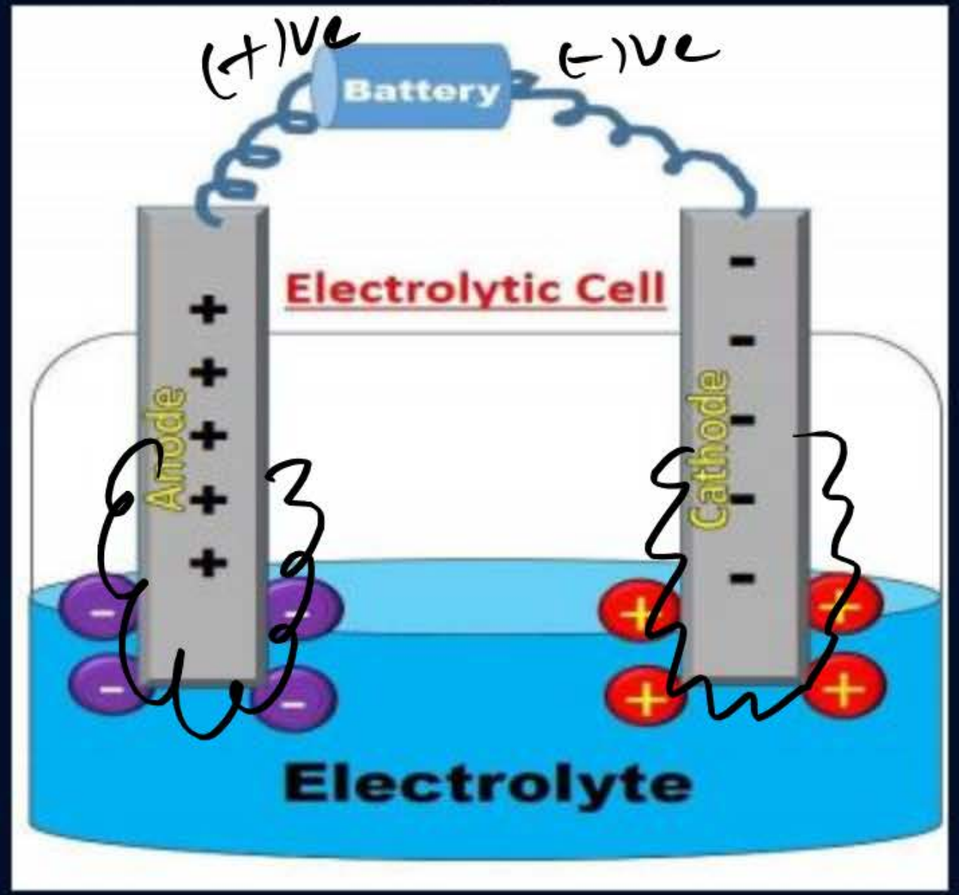
Inert Electrodes

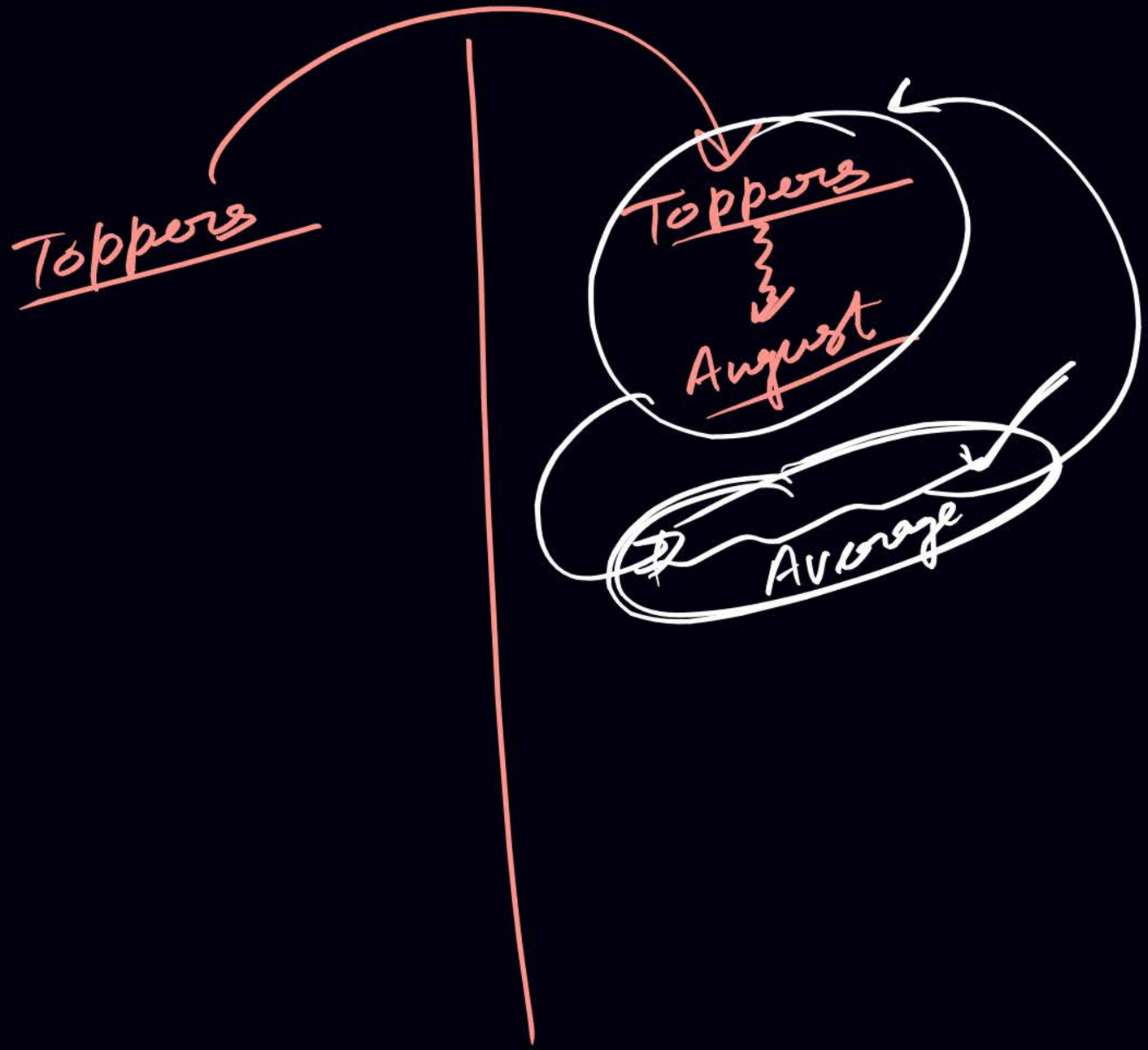
↓

Graphite, Pt, Mercury

Cathode → Reduction of Cation $C^+ + 1e^- \rightarrow C$

Anode → Oxidation of Anion $A^- \rightarrow A + 1e^-$




Toppers
Toppers
&
August
Average

Discharge Potential (D.P.)

Potential applied by battery so that

Reduction occurs at cathode of cation.

Oxidation occurs at anode of anion

#IIT

Lower the discharge potential of ion

→ It will be discharged first at electrode (Cathode or anode).

Raghuz.

↓

D.P. low

↓

First discharge

↓

1 Chappal + 1 Thappad

+ 1 Chappal extra ✓

Atharva

↓

D.P. high

↓

Late discharge

↓

3 Chappal + 2 Thappad

+ 2 Chappal + 2 Thappad] ✓ extra

Discharge Potential Order of Cation

$E^{\circ}_{Cu^{2+}/Cu} = 0.34\,V$

#MIT

Discharge potential depends upon S.R.P. and Overvoltage.

Excess voltage above S.R.P. which is required for discharge of cation.

Higher the S.R.P. → Lesser is the discharge potential → ECS neeche (down)

→ It will be discharged first at cathode.

Zn^{2+}, H^+

$2H^+ + 2e^- \rightarrow H_2(g)$

Cl^-, OH^-

$2Cl^- \rightarrow Cl_2(g) + 2e^-$

Cu^{2+}, H^+

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

OH^- NO_3^-

$2OH^- \rightarrow O_2(g) + H_2O(l)$

Discharge Potential Order of Cation

#MIT

Higher S.O.P. ⇒ Lesser D.P. ∴ anion should discharge first at anode.

but not applied $OH^- > Cl^-$ (S.O.P. ↑) but due to over voltage $Cl^- > OH^-$ (tendency to oxidise at anode ↑)

SuNO usin in C.B.I.

$SO_4^{2-} < NO_3^- < OH^- < Cl^- < Br^- < I^-$

tendency to discharge at anode ↑

$2I^- \rightarrow I_2 + 2e^-$

$2Br^- \rightarrow Br_2 + 2e^-$

$2Cl^- \rightarrow Cl_2 + 2e^-$

$2OH^- \rightarrow O_2(g) + H_2O(l)$

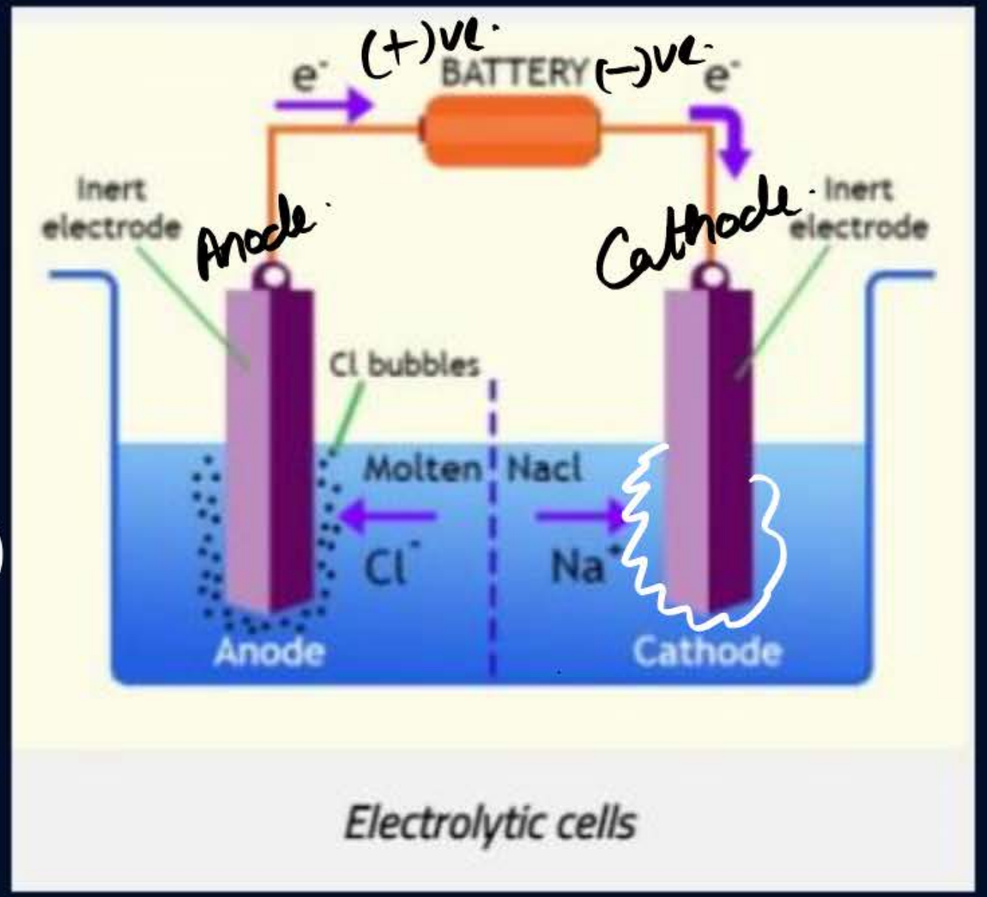
$NO_3^- \rightarrow NO_2 + 1e$

Electrolysis of Molten NaCl

At Cathode:- $Na^+ + 1e^- \rightarrow Na(s)$

At Anode:- $1Cl^- \rightarrow \frac{1}{2}Cl_2 + 1e^-$

$$1Na^+ + 1Cl^- \rightarrow 1Na + \frac{1}{2}Cl_{2(g)}$$



Electrolytic cells

Electrolysis of Aqueous NaCl using graphite as electrode

Cl^-, OH^- ✓ Na^+ ✓, H^+

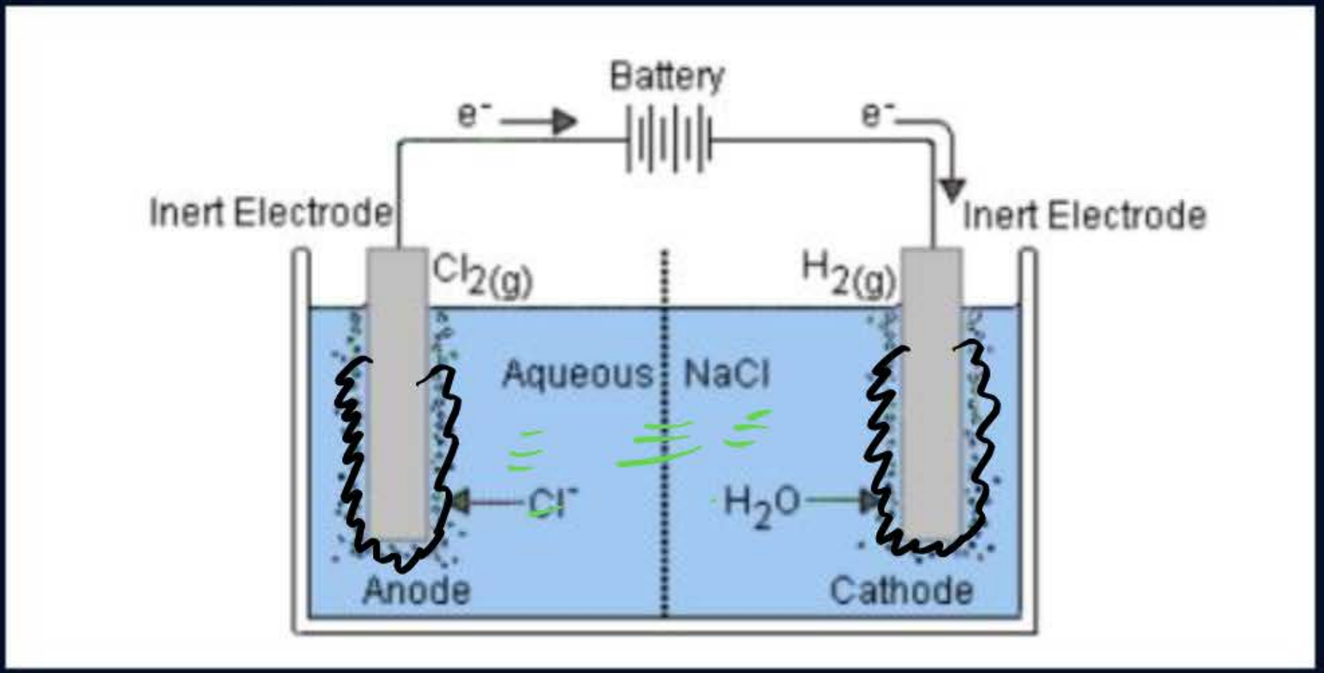
Na^+Cl^- (aq.)

At Cathode: $2H^+ + 2e^- \rightarrow H_2(g)$

At Anode: $2Cl^- \rightarrow Cl_2(g) + 2e^-$

aq. NaOH formed ∴ Sol^n basic.

∴ pH ↑



Electrolysis of Aqueous NaCl using Hg as Cathode

In this case

D.P. Na^+ < D.P. H^+

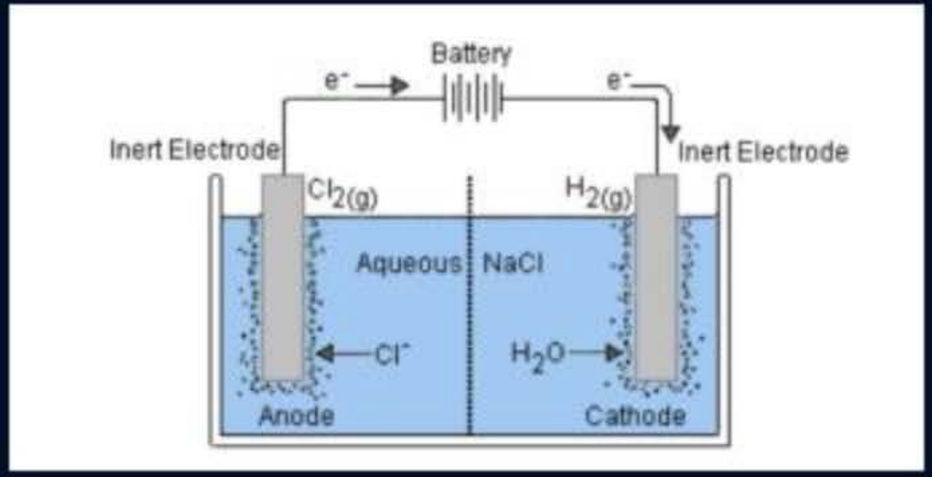
Order discharge at cathode inc.

As sodium will from sodium amalgam at cathode.

At Cathode : $Na^+ + 1e^- \xrightarrow{Hg} Na(Hg)$

Sodium amalgam

At Anode : $2Cl^- \rightarrow Cl_2 + 2e^-$



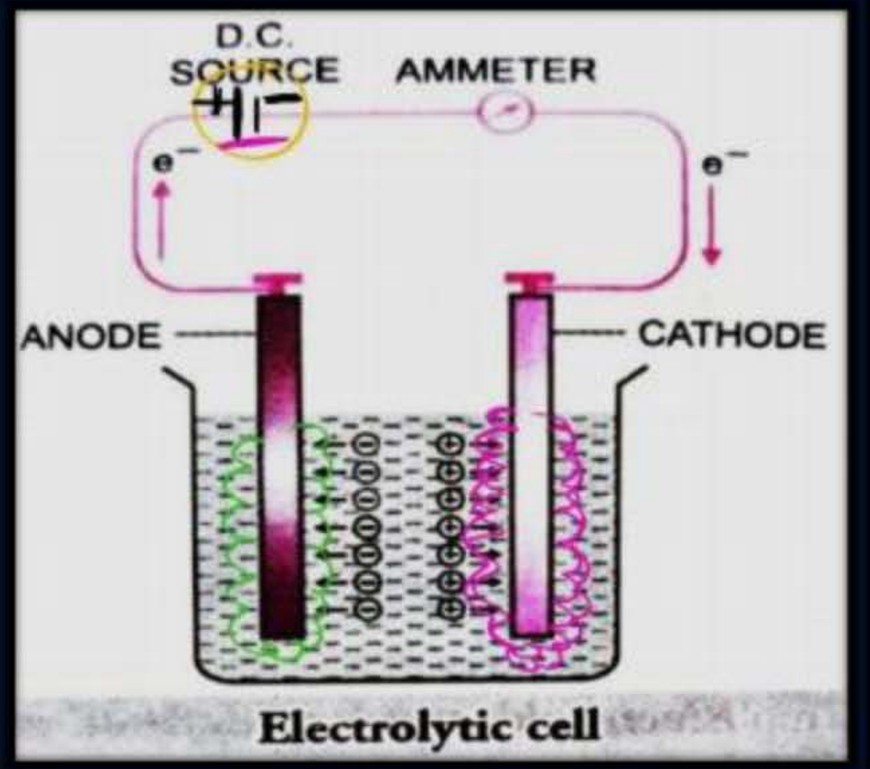
Electrolysis of Aqueous $CuSO_4$ using Inert Electrodes

Cation → H^+ Cu^{2+}

Anode → SO_4^{2-} OH^-

At Cathode: $Cu^{2+} + 2e^- \rightarrow Cu(s)$

At Anode: $2OH^- \rightarrow O_2(g) + H_2O + 2e^-$



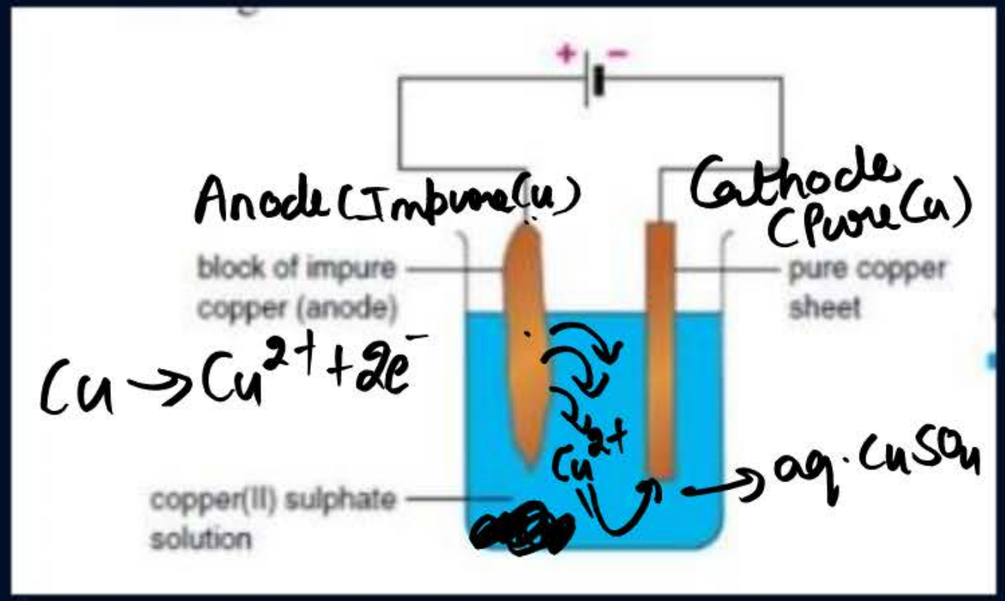
Resulting solution is acidic in nature due to formation of H_2SO_4 i.e. pH decreases.

Electrolysis of Aqueous $CuSO_4$ using Copper Electrodes (Attacking electrodes)

At Anode: $Cu \rightarrow Cu^{2+} + 2e^-$

At Cathode: Cu^{2+}, H^+

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



Ag^+, H^+ NO_3^-, OH^-

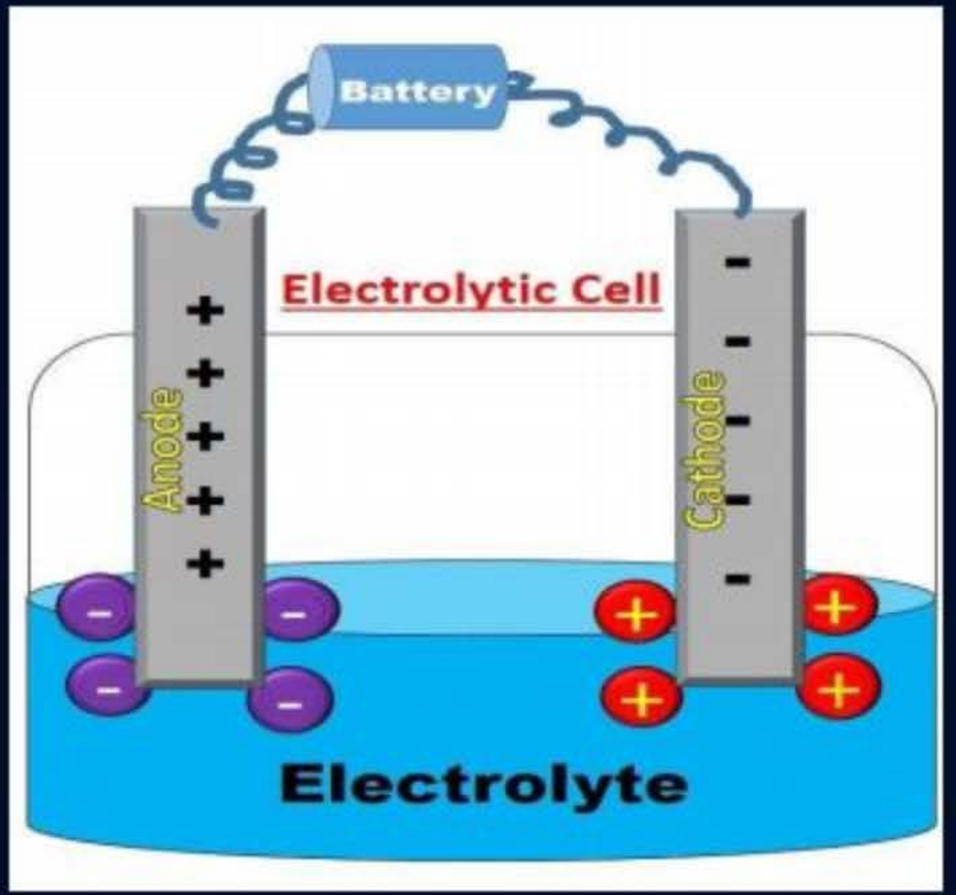
Electrolysis of aq. $AgNO_3$ using Inert electrodes at ~~Cathode~~.

Cathode:

$$2Ag^+ + 2e^- \rightarrow 2Ag(s)$$

At anode:

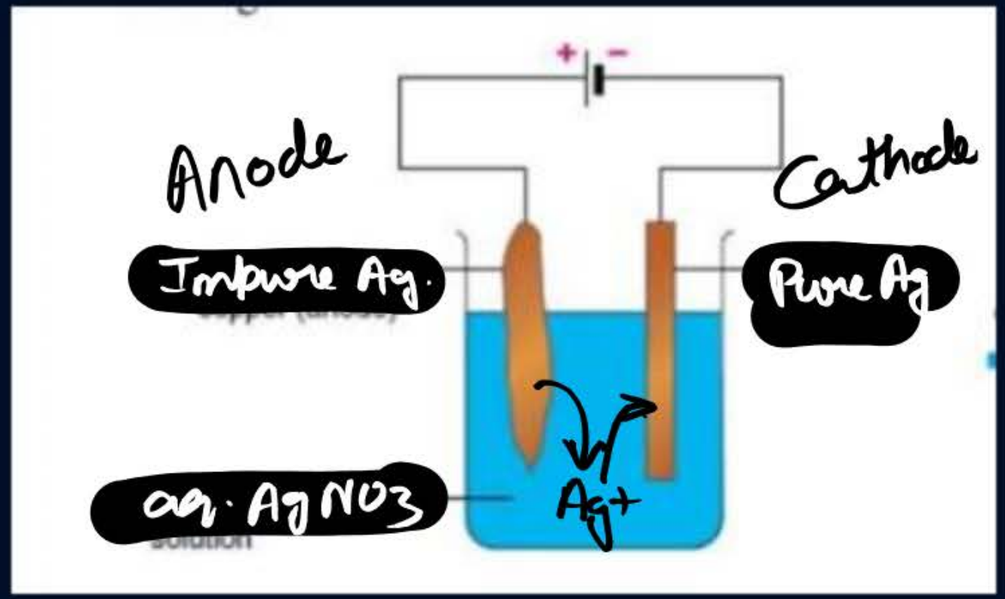
$$2OH^- \rightarrow O_2(g) + H_2O + 2e^-$$



Electrolysis of aq. $AgNO_3$ using silver (Ag) electrodes (Attacking)

Anode $\rightarrow Ag \rightarrow Ag^+ + 1e^-$

Cathode $\rightarrow Ag^+ + 1e^- \rightarrow Ag$



Electrolysis of Acidified Water

$H^+_{(aq)}$ | H^+, HSO_4^-

$H_2O + 50\%\ H_2SO_4$ (conc. H_2SO_4)

$H_2SO_4 \rightarrow H^+ + HSO_4^-$

Conc.

Cathode:

$2H^+ + 2e^- \rightarrow H_2(g)$

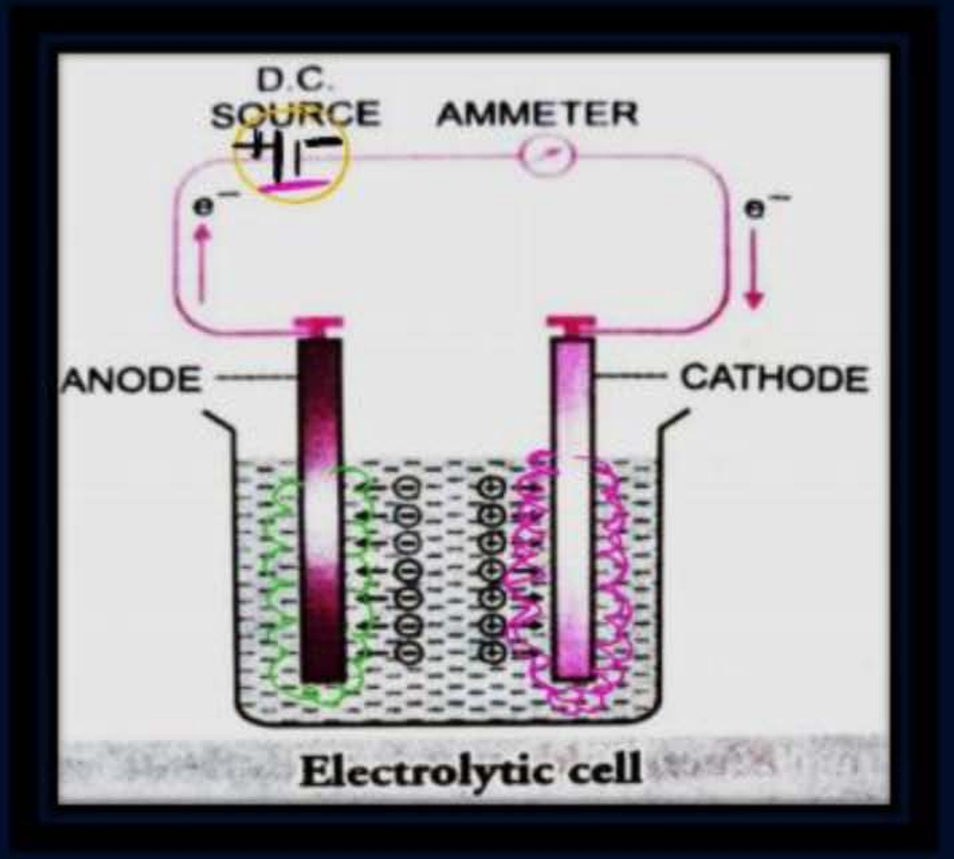
Anode:

D.P. of HSO_4^- < D.P. of OH^-

←

Order of discharge at anode inc.

$HSO_4^- \rightarrow H_2S_2O_8 + 2e^-$



electrolysis of dil. H_2SO_4

$$H_2SO_4 \rightarrow 2H^+ + 1SO_4^{2-}$$

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

at Cathode :- $2H^+ + 2e^- \rightarrow H_2(g)$

at anode :- $2OH^- \rightarrow O_2 + H_2O + 2e^-$

Q. electrolysis of aq. $Hg(NO_3)_2$ using inert electrodes:

$Hg^{2+}, H^+ \mid OH^-, NO_3^-$

Cathode : $Hg^{2+} + 2e^- \rightarrow Hg(l)$

anode : $2OH^- \rightarrow O_2 + H_2O + 2e^-$

Acidic Colourless, basic pink.

Phenopthalin

8.3 - 10

Q. aq. soln of Na_2SO_4 containing small amount of HPh is electrolysed using Pt-electrode : Colour of soln will be :

(a) remain Colourless

(b) Change from pink to Colourless

(c) " " colourless to pink.

(d) remain pink.

Na^+, H^+

K^+, SO_4^{2-}

Cathode : $2H^+ + 2e^- \rightarrow H_2(g)$

anode : $2OH^- \rightarrow O_2 + H_2O + 2e^-$

Q. electrolytic cell $Ag/AgNO_3/Ag$.

when current is passed Conc. of $AgNO_3$

(a) ↑

(b) ↓

(c) Same.

(d) none of these.

$Ag \rightarrow Ag^+ + 1e^-$

$Ag^+ + 1e^- \rightarrow Ag$

Q acidic sol^n of $CuSO_4$ has some impurity of Zn^{2+} & Fe^{2+} it is electrolysed till all Cu is deposited. If electrolysis is further continued for sometime now product liberated at Cathode

(a) Fe

(b) Zn

(c) H_2

(d) an alloy of Zn & Fe

H^+ Cu^{2+} Zn^{2+} Fe^{2+}

$2H^+ + 2e^- \rightarrow H_2(g)$

Faraday's First Law of Electrolysis

$m \propto q$

$m = Z q$

Z = electrochemical equivalent

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

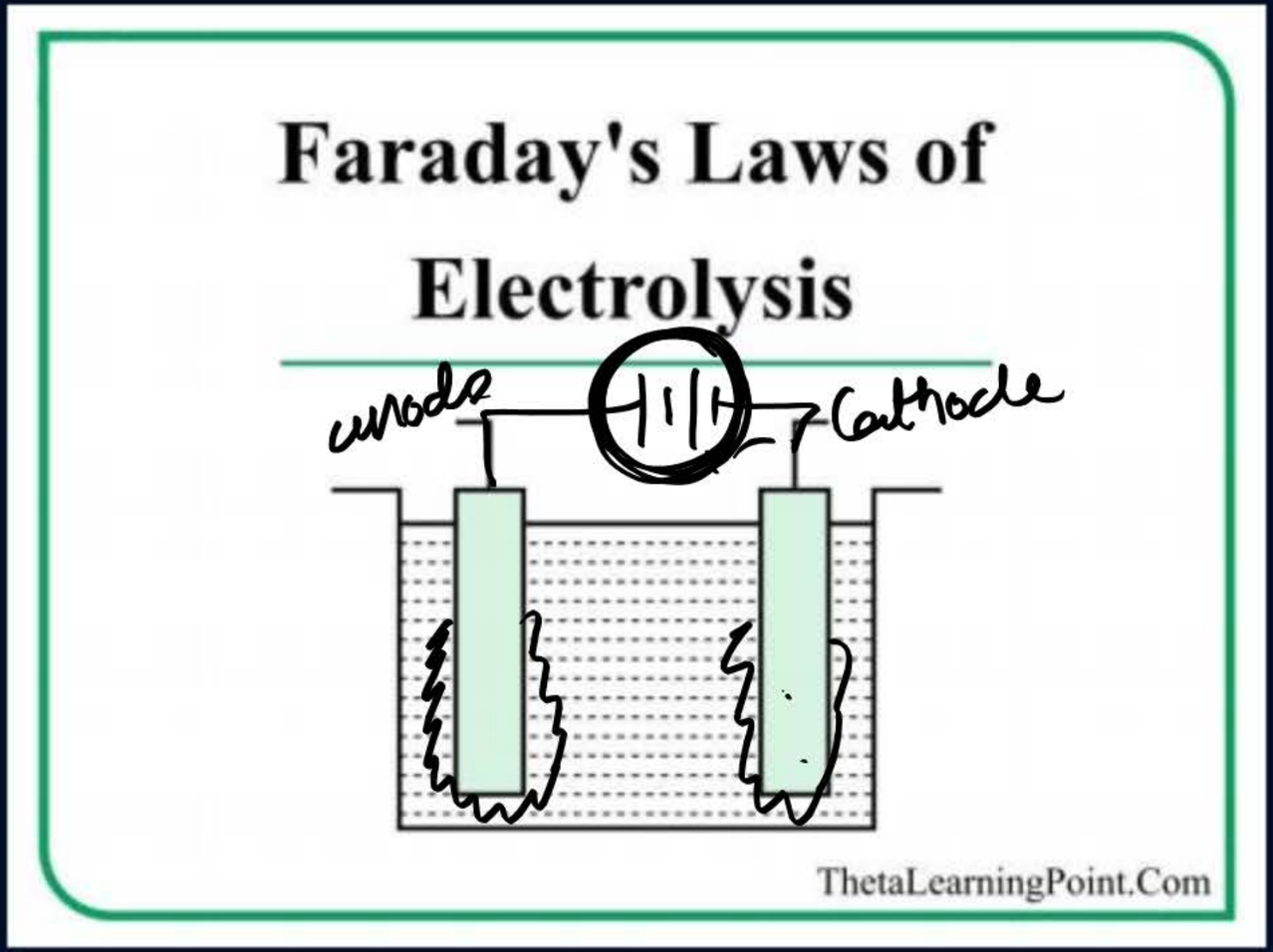
$q = It$

$q = ne^-$

$n = \text{no. of } e^-$

$e^- = \text{Charge}$

$= 1.6 \times 10^{-19} C$



$m = Z\,I\,t$

$m = \frac{eq.wt.\ I\,t}{F}$

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

n = no. of $\bar{e}$ lost or gained.

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$Cu^{2+} + 2\bar{e} \rightarrow Cu$
$n = 2$

$Al^{3+} + 3\bar{e} \rightarrow Al$
$n = 3$

$2H^+ + 2\bar{e} \rightarrow H_2(g)$
$n = 2$

$2Cl^- \rightarrow Cl_2 + 2\bar{e}$ $n = 2$

$Cl^- \rightarrow \frac{1}{2}Cl_2 + 1\bar{e}$ $n = 1$

QUESTION [NEET 2020]

On electrolysis of dil. Sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be :

A Oxygen gas

B H_2S gas

C SO_2 gas

D Hydrogen gas

QUESTION-(NEET 2024)

Match List-I with List-II.

	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

(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

QUESTION [NEET 2013]

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)

A 4.0

B 20.0

C 40.0

D 0.66

QUESTION-(NEET 2024)

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)

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

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

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}

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

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

Faraday's Second Law of Electrolysis

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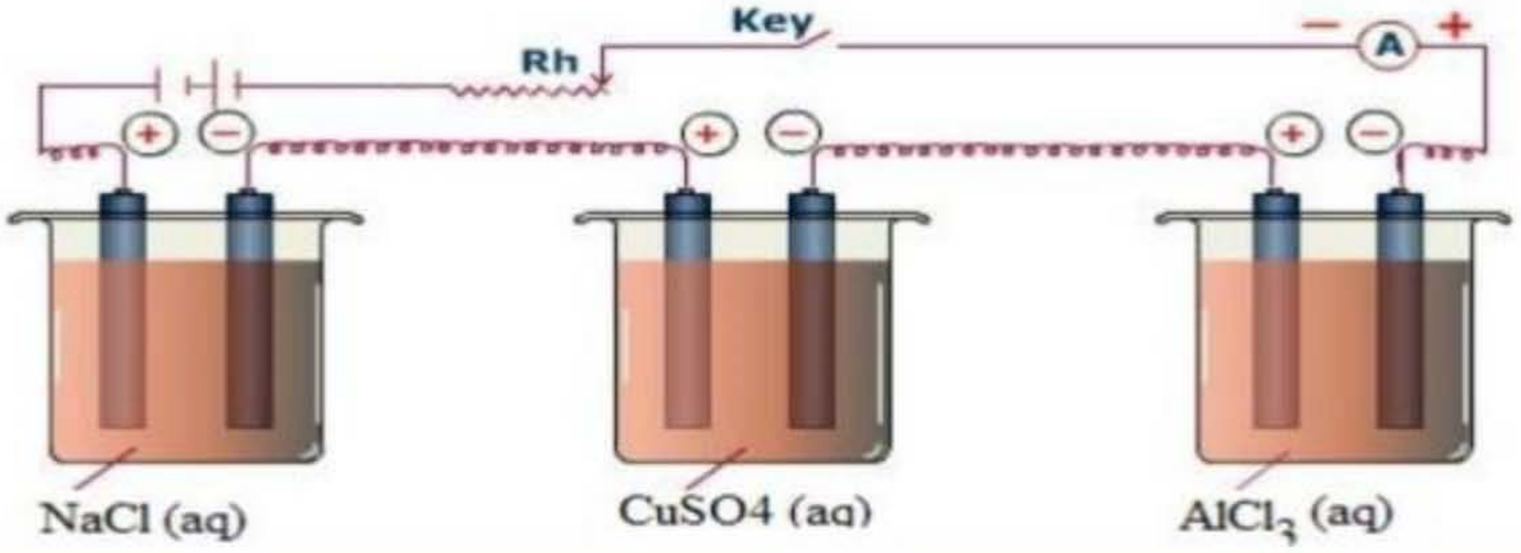

QUESTION

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)

Magarmach Practice Questions

QUESTION – (AIIMS 2018 (E), 26 May)

Assertion: Reverse current flows in charging of lead storage battery.
Reason: During charging $PbSO_4$ convert into Pb and PbO_2

A. If both Assertion and Reason are correct and the Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

C. If Assertion is correct but Reason is incorrect.

D. If both the Assertion and Reason are incorrect.

QUESTION – (AIIMS 2018 (M), 26 May)

Assertion: When 1 M $CuSO_4(aq)$ solution is electrolyzed using copper electrodes, copper is dissolved at anode and copper gets deposited at cathode.

Reason: The standard oxidation potential of copper is less than the standard oxidation potential of water and standard reduction potential of copper is greater than the standard reduction potential of water.

(A) If both Assertion and Reason are correct and the Reason is the correct explanation of Assertion.

(B) If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

(C) If Assertion is correct but Reason is incorrect.

(D) If both the Assertion and Reason are incorrect.

QUESTION – (AIIMS 2018 (E), 26 May)

For hydrogen oxygen fuel cell, the cell reaction is
$2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$
If $\Delta G_f^o(H_2O) = -237.2$ kJ mol^{-1}, then emf of this cell is:

A. +2.46 V

B. –2.46 V

C. +1.23 V

D. –1.23 V

QUESTION – (AIIMS 2014)

Assertion: During electrolysis of $CuSO_4(aq)$ using copper electrodes, copper is dissolved at anode and deposited at cathode.
Reason: Oxidation takes place at anode and reduction at cathode.

A If both Assertion and Reason are correct and the Reason is the correct explanation of Assertion.

B If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

C If Assertion is correct but Reason is incorrect.

D If both the Assertion and Reason are incorrect.

QUESTION – (AIIMS 2008)

Assertion: The cell potential of mercury cell is 1.35 V, which remains constant.

Reason: In mercury cell, the electrolyte is a paste of KOH and ZnO.

A. If both Assertion and Reason are correct and the Reason is the correct explanation of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

C. If Assertion is correct but Reason is incorrect.

D. If both the Assertion and Reason are incorrect.

QUESTION – (AIIMS 2006)

The product formed when an aqueous solution of NaBr is electrolyzed in a cell having inert electrode are:

(A) Na and Br_2

(B) Na and O_2

(C) H_2, Br_2 and NaOH

(D) H_2 and O_2

QUESTION – (AIIMS 2005)

Assertion: Galvanized iron does not rust.
Reason: Zinc has a more negative electrode potential than iron.

A. If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

B. If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

C. If the Assertion is correct but Reason is incorrect.

D. If both the Assertion and Reason are incorrect.

E. If the Assertion is incorrect but the Reason is correct.

QUESTION – (AIIMS 2003)

Which of the following reactions is used to make a fuel cell?

(A) $Cd(s) + 2Ni(OH)_3(s) \rightarrow CdO(s) + 2Ni(OH)_2(s) + H_2O(l)$

(B) $Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \rightarrow 2PbSO_4(s) + 2H_2O(l)$

(C) $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

(D) $2Fe(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{2+}(aq) + 2H_2O(l)$

QUESTION – (AIIMS 1999)

Assertion: A small amount of acid or alkali is added before electrolysis of water.
Reason: Pure water is weak electrolyte.

A. If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

B. If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

C. If the Assertion is correct but Reason is incorrect.

D. If both the Assertion and Reason are incorrect.

E. If the Assertion is incorrect but the Reason is correct.

QUESTION – (NCERT Exemplar)

While charging the lead storage battery _____.

(A) $PbSO_4$ anode is reduced to Pb.

(B) $PbSO_4$ cathode is reduced to Pb.

(C) $PbSO_4$ cathode is oxidized to Pb.

(D) $PbSO_4$ anode is oxidized to PbO_2.

QUESTION* – (NCERT Exemplar)

$E^{\ominus}_{cell}$ for some half cell reactions are given below. On the basis of these mark the correct answer.

(a) $H^+(aq) + e^- \rightarrow \frac{1}{2}H_2(g)$; $E^{\ominus}_{cell} = 0.00V$

(b) $2H_2O(l) \rightarrow O_2(g) + 4H^+(aq) + 4e^-$; $E^{\ominus}_{Cell} = 1.23V$

(c) $2SO_4^{2-}(aq) \rightarrow S_2O_8^{2-}(aq) + 2e^-$; $E^{\ominus}_{cell} = 1.96V$

A. In dilute sulphuric acid solution, hydrogen will be reduced at cathode.

B. In concentrated sulphuric acid solution, water will be oxidised at anode.

C. In dilute sulphuric acid solution, water will be oxidised at anode.

D. In dilute sulphuric acid solution, SO_4^{2-} ion will be oxidised to tetrathionate ion at anode.

QUESTION* – (NCERT Exemplar)

$E^{\ominus}_{cell}$ = 1.1V for Daniel cell. Which of the following expressions are correct description of state of equilibrium in this cell?

(A) $1.1 = K_c$

(B) $\frac{2.303\,RT}{2F}\log K_c = 1.1$

(C) $\log K_c = \frac{2.2}{0.059}$

(D) $\log K_c = 1.1$

QUESTION* – (NCERT Exemplar)

What will happen during the electrolysis of aqueous solution of $CuSO_4$ by using platinum electrodes?

(A) Copper will deposit at cathode.

(B) Copper will deposit at anode.

(C) Oxygen will be released at anode.

(D) Copper will dissolve at anode.

QUESTION – (NCERT Exemplar)

Match the items of Column I and Column II.

Column I	Column II
(i) Lead storage battery	(a) maximum efficiency
(ii) Mercury cell	(b) prevented by galvanization
(iii) Fuel cell	(c) gives steady potential
(iv) Rusting	(d) Pb is anode, PbO_2 is cathode

QUESTION – (NCERT Exemplar)

Match the items of Column I and Column II.

Column I	Column II
(i) Le chlanche cell	(a) cell reaction $2H_2 + O_2 \rightarrow 2H_2O$
(ii) Ni–Cd cell	(b) does not involve any ion in solution and is used in hearing aids.
(iii) Fuel cell	(c) rechargeable
(iv) Mercury cell	(d) reaction at anode, $Zn \rightarrow Zn^{2+} + 2e^-$
	(e) converts energy of combustion into electrical energy.

QUESTION – (NCERT Exemplar)

Assertion: Mercury cell does not give steady potential.
Reason: In the cell reaction, ions are not involved in solution.

A. Both assertion and reason are true and the reason is the correct explanation of assertion.

B. Both assertion and reason are true and the reason is not the correct explanation of assertion.

C. Assertion is true but the reason is false.

D. Both assertion and reason are false.

E. Assertion is false but reason is true.

QUESTION – (NCERT Exemplar)

Assertion: Electrolysis of NaCl solution gives chlorine at anode instead of O_2.
Reason: Formation of oxygen at anode requires overvoltage.

A. Both assertion and reason are true and the reason is the correct explanation of assertion.

B. Both assertion and reason are true and the reason is not the correct explanation of assertion.

C. Assertion is true but the reason is false.

D. Both assertion and reason are false.

E. Assertion is false but reason is true.

QUESTION-(NEET 2020-Covid)

In a typical fuel cell, the reactants (R) and product (P) are:

(A) $R = H_{2(g)}, O_{2(g)}; P = H_2O_{(l)}$

(B) $R = H_{2(g)}, O_{2(g)}, Cl_{2(g)}; P = HClO_{4(aq)}$

(C) $R = H_{2(g)}, N_{2(g)}; P = NH_{3(aq)}$

(D) $R = H_{2(g)}, O_{2(g)}; P = H_2O_{2(l)}$

QUESTION-(NEET 2016-II)

Zinc can be coated on iron to produce galvanized iron but the reverse is not possible. It is because:

A. Zinc has lower negative electrode potential than iron.

B. Zinc has higher negative electrode potential than iron.

C. Zinc is lighter than iron.

D. Zinc has lower melting point than iron.

QUESTION-(NEET 2015)

A device that converts energy of combustion of fuels like hydrogen and methane, directly into electrical energy is known as:

A. Electrolytic cell

B. Dynamo

C. Ni-Cd cell

D. Fuel cell

QUESTION – (AIPMT 2007)

The efficiency of a fuel cell is given by

A $\frac{\Delta G}{\Delta S}$

B $\frac{\Delta G}{\Delta H}$

C $\frac{\Delta S}{\Delta G}$

D $\frac{\Delta H}{\Delta G}$

THANK YOU