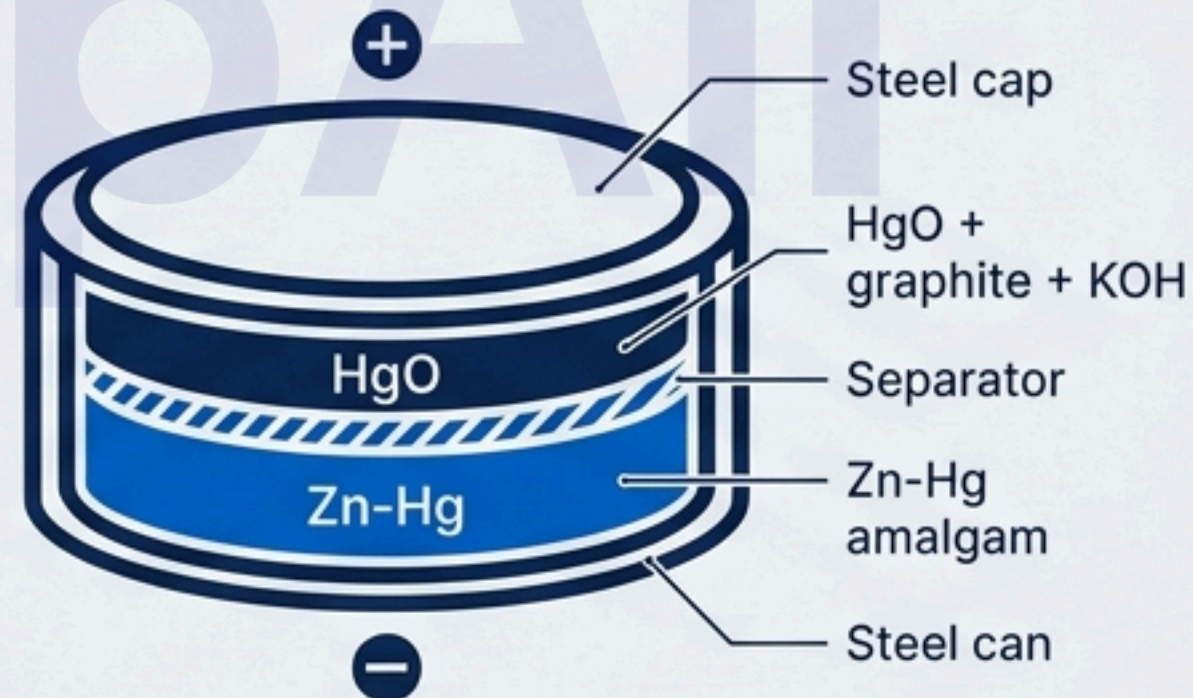
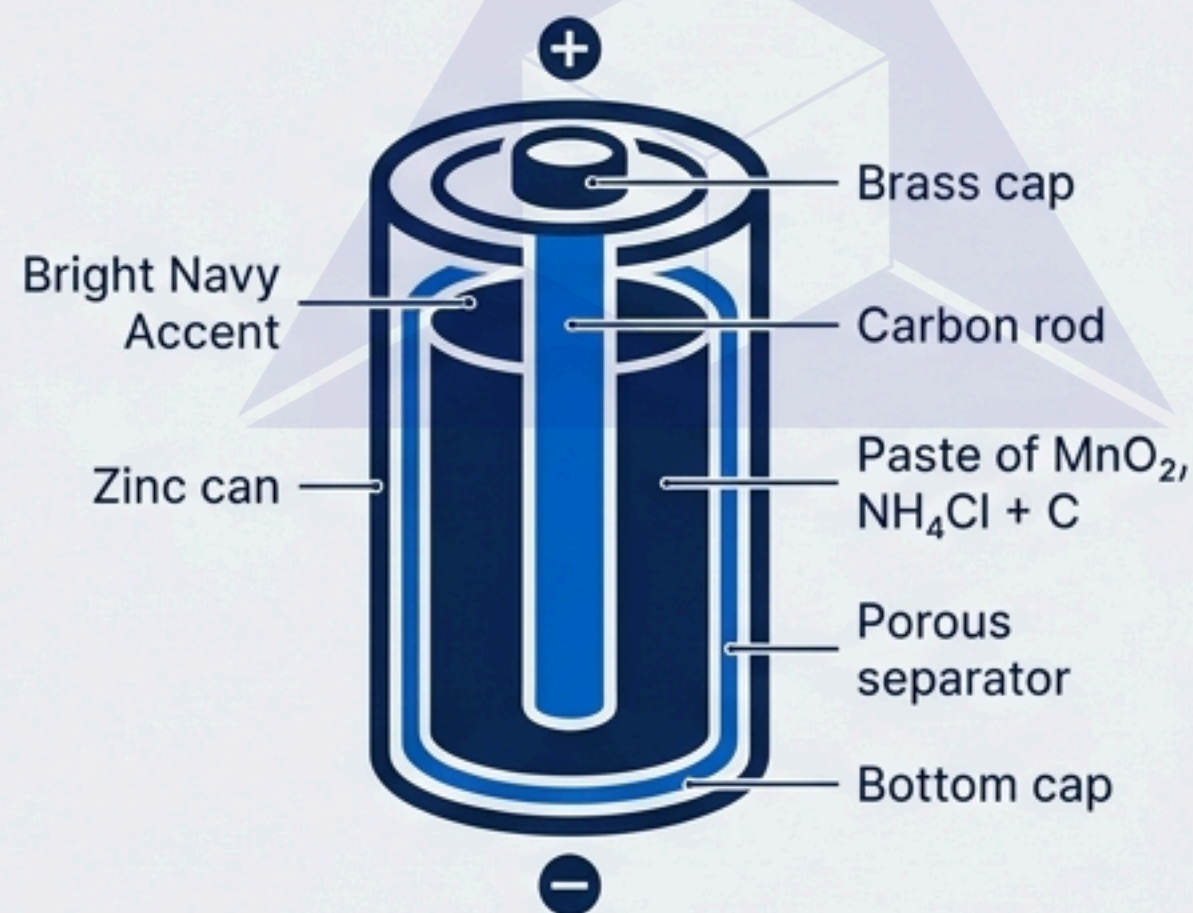


Dry Cell & Mercury Cell

Primary Batteries



Anatomy of a Dry Cell (Leclanche Cell)



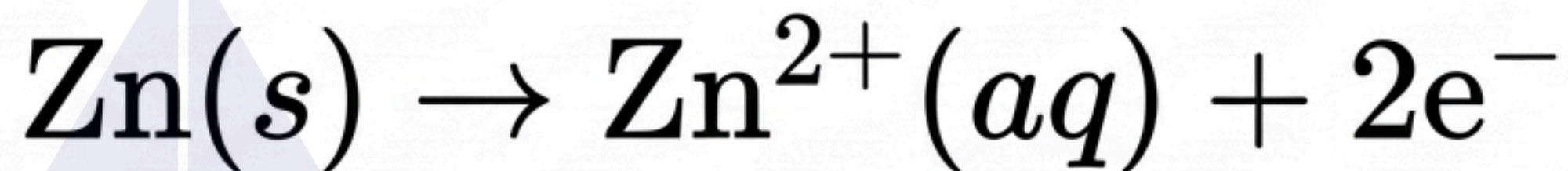
ZINC CONTAINER
(Anode)

GRAPHITE ROD
(Cathode)

POWDERED MnO₂ + CARBON
(Depolarizer)

MOIST PASTE
(NH₄Cl / ZnCl₂ Electrolyte)

Anode Reaction: Zinc Container



Oxidation occurs at the zinc container, releasing electrons into the external circuit.

JEE TRAP

Because solid zinc is consumed during this reaction, the zinc container eventually becomes porous and leaks corrosive chemicals. Never leave dead dry cells in expensive electronics!



**You've Learned the Theory.
Let's Test Them Now.**

$$E=mc^2$$



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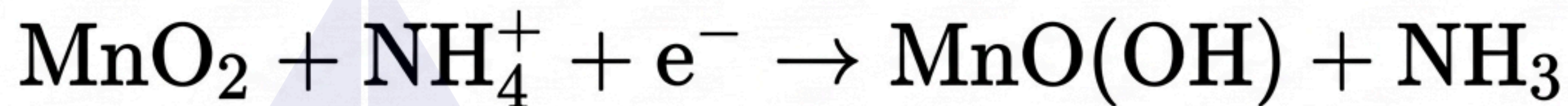
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Cathode Reaction: Graphite Core



KEY TAKEAWAYS

- Manganese is reduced.
- Oxidation state changes from **+4 to +3**.

REACTION INSIGHT

The NH_3 gas produced does not build up pressure. It immediately forms a complex with Zn^{2+} ions to yield $[\text{Zn}(\text{NH}_3)_4]^{2+}$.

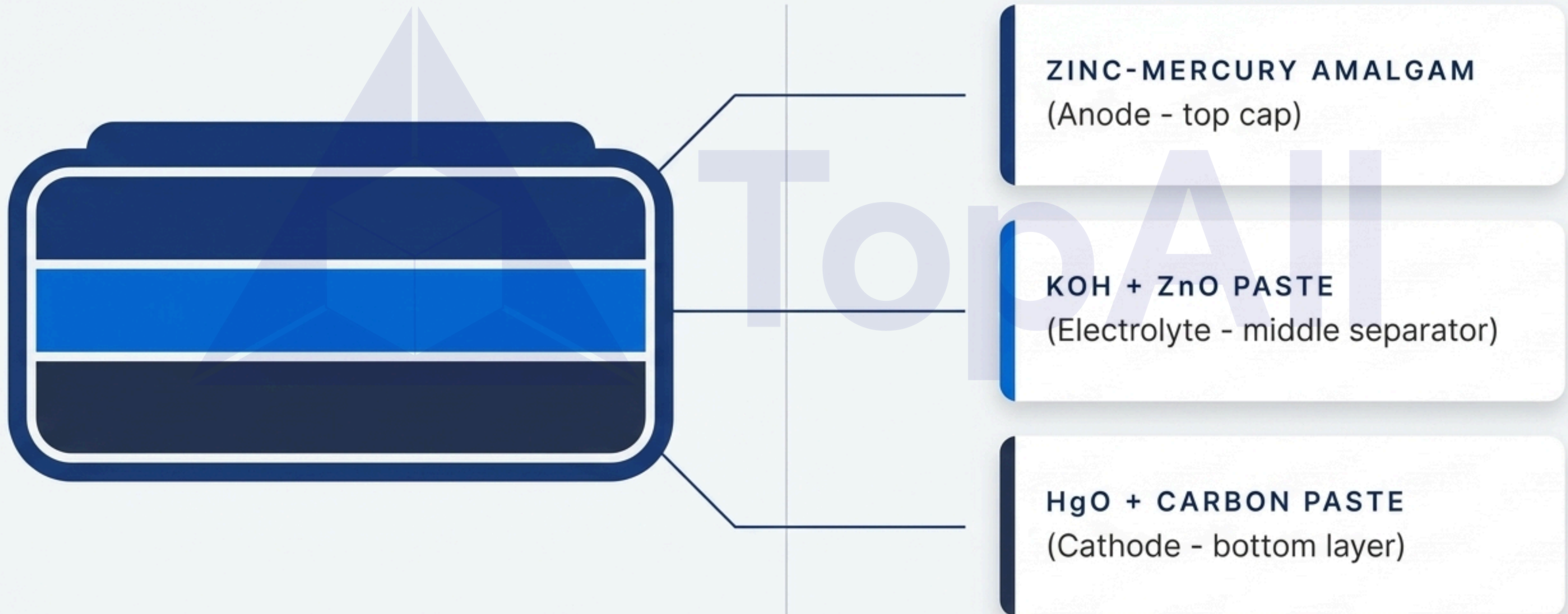
Operating Voltage



≈ 1.5 V

The potential of a Leclanche cell drops continuously over time. This happens because the overall reaction involves aqueous ions (like NH_4^+ and Zn^{2+}) whose concentrations change dynamically as the battery discharges.

Anatomy of a Mercury Button Cell



Mercury Cell Electrochemistry

Operating Voltage: ≈ 1.35 V

ANODE REACTION



CATHODE REACTION



OVERALL REACTION



The Constant Voltage Phenomenon

Why does the Mercury cell output a steady 1.35 V throughout its entire life?

The overall cell reaction does not involve any solution ions whose concentration can change significantly during cell life.

DRY CELL

Overall reaction contains aqueous ions



Concentration changes during discharge



Voltage drops over time

MERCURY CELL

Overall reaction contains only solids & pure liquids (ZnO, Hg)



Reaction quotient Q remains constant



Voltage remains completely flat



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