

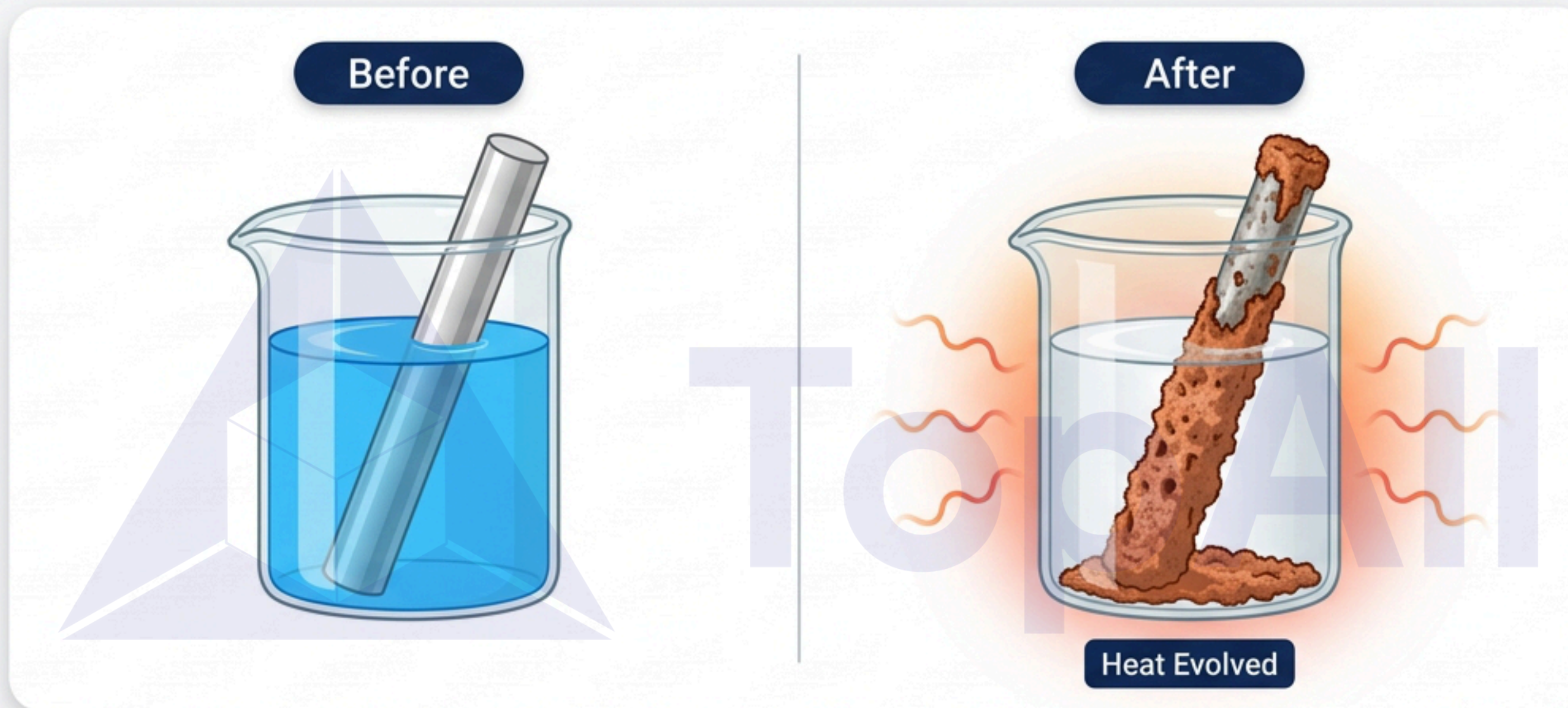
Turning Redox Into Electricity



The Mechanics of the Daniell Cell and Electrode Processes

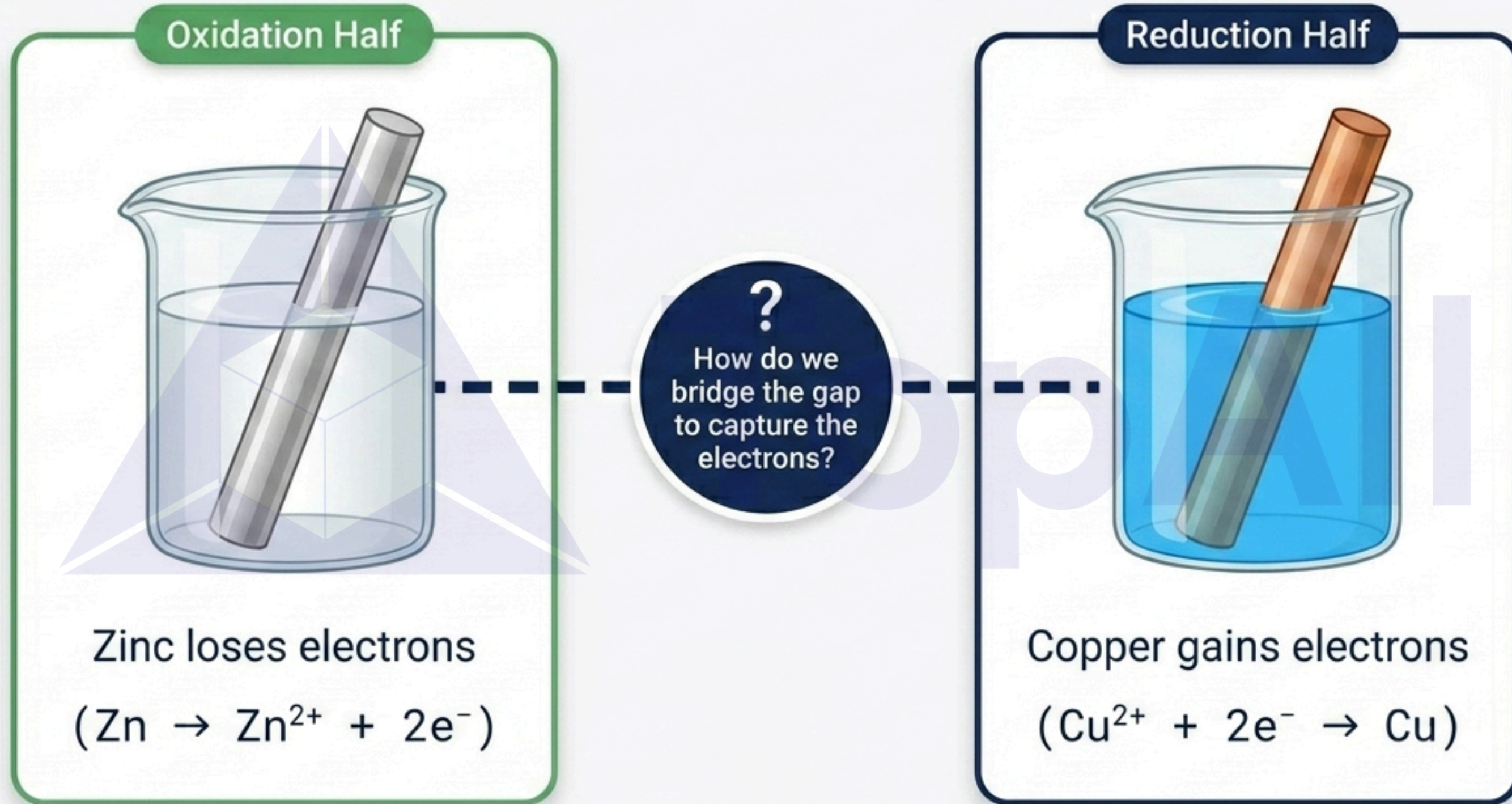


The Problem with Direct Reactions



Electrons transfer directly from Zinc to Copper. Energy is lost as heat, not captured as electricity.

The Engineering Solution: Separation



Anatomy of the Daniell Cell





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$$E=mc^2$$



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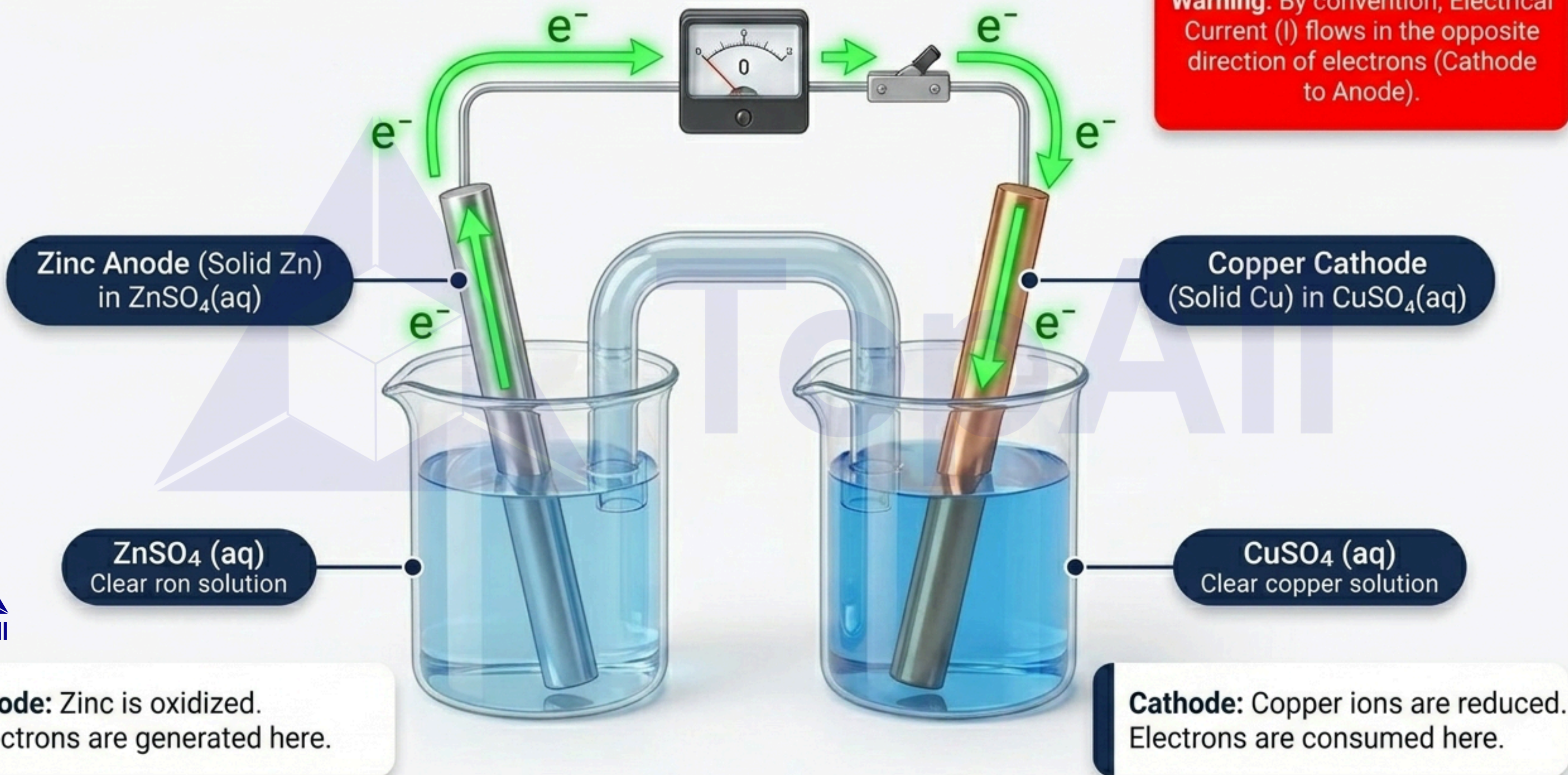
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Key Highlights

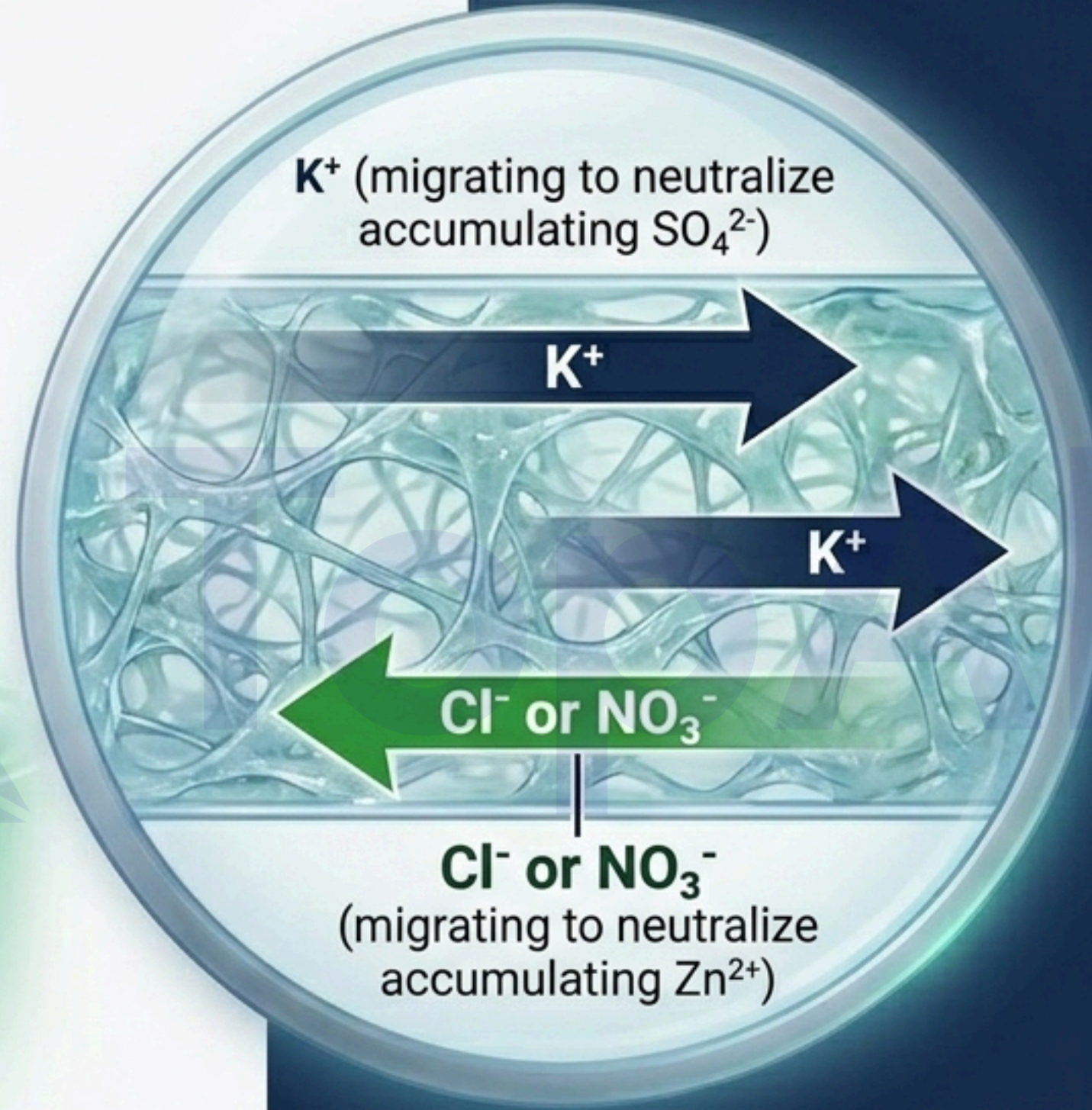
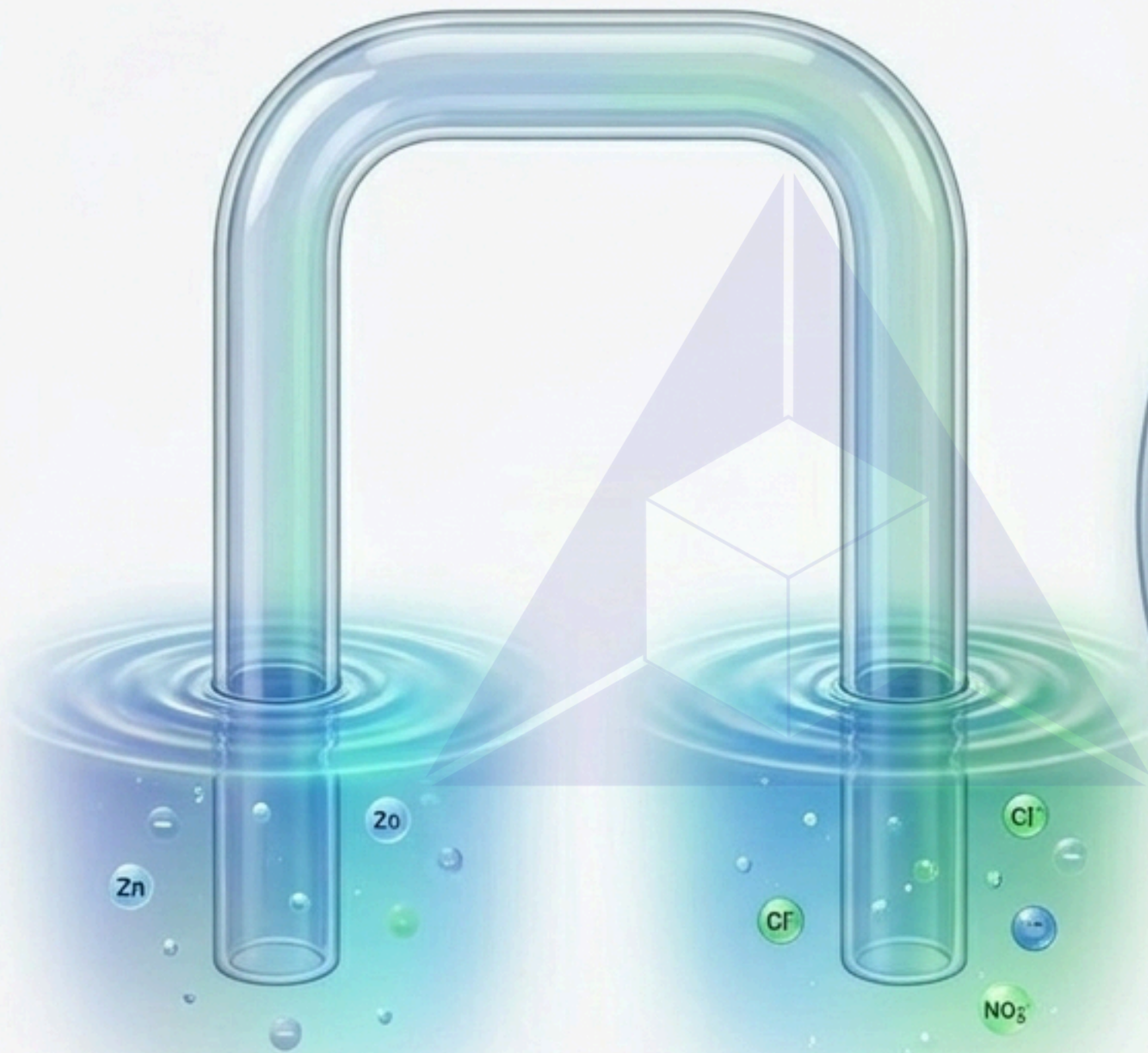
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The External Circuit: Tracing Electron Flow



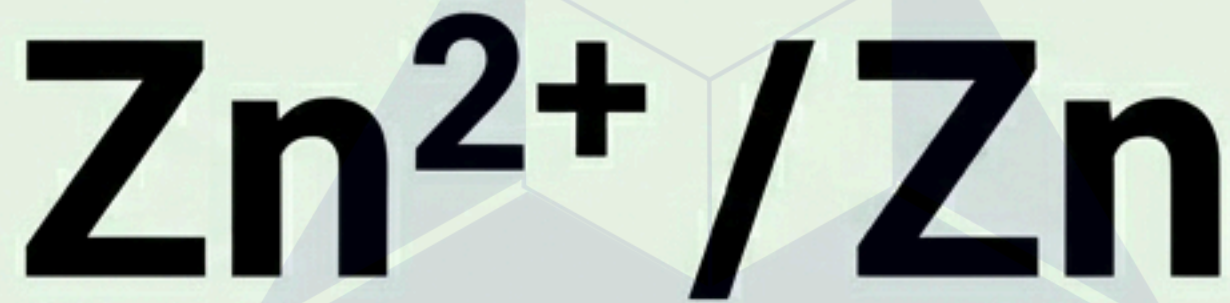
The Internal Circuit: The Salt Bridge



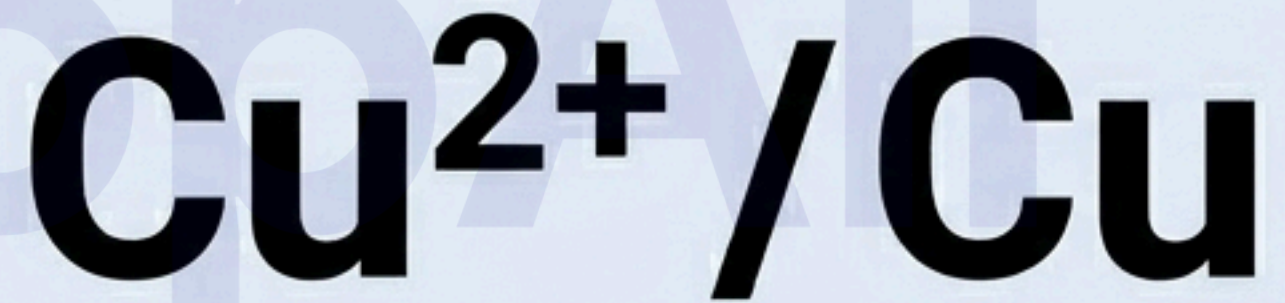
- Contains KCl or NH_4NO_3 solidified in agar-agar.
- Completes the electrical circuit.
- Maintains electrical neutrality in both beakers without mixing the solutions.

Chemical Notation: The Redox Couple

A **redox couple** represents the oxidized and reduced forms of a substance taking part in a half-reaction, separated by a slash (interface).

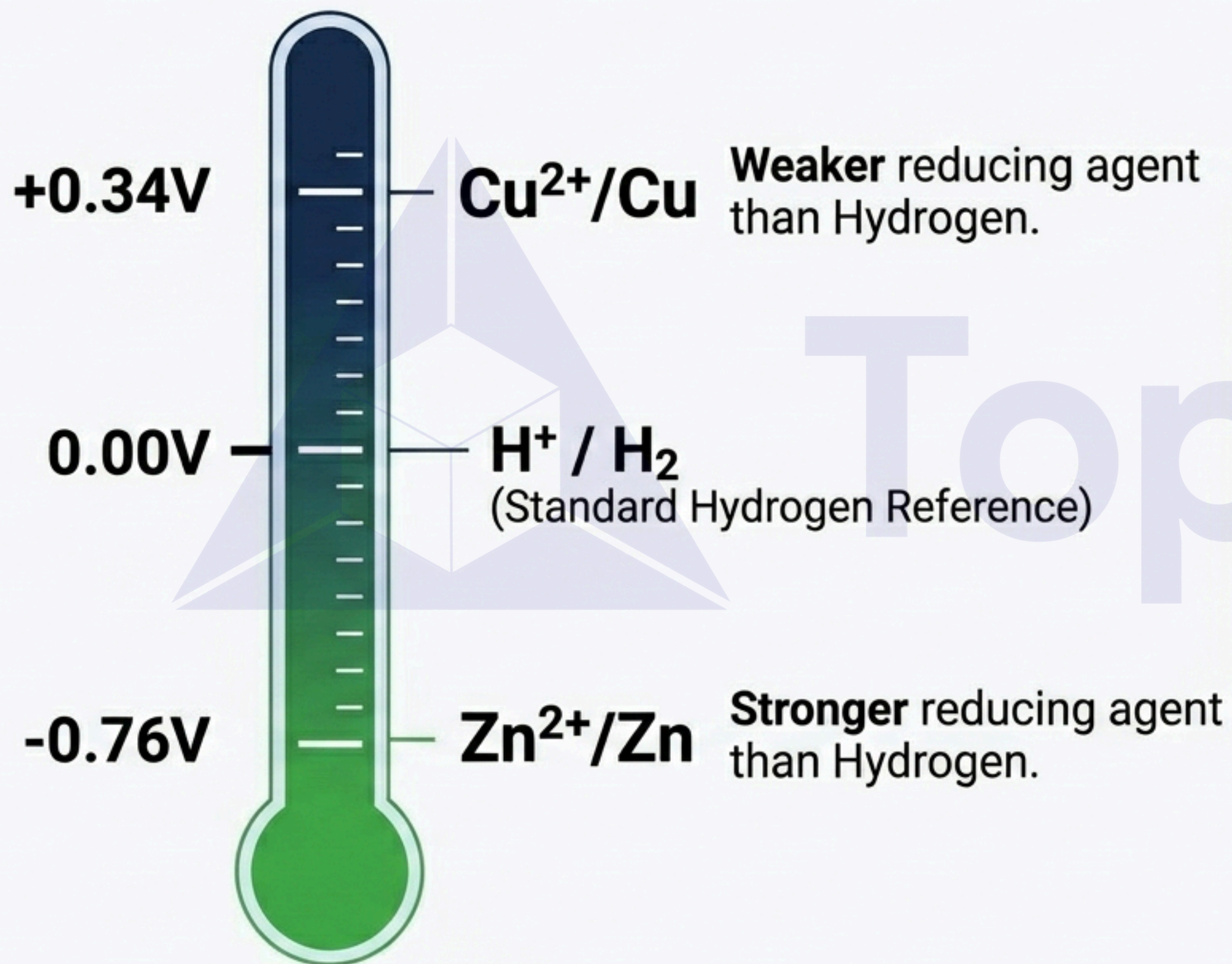


Oxidized form (Zn^{2+}) is always written before the reduced form (Zn).



Represents the solid/solution interface at the electrode.

Quantifying the Flow: Standard Electrode Potential ($E^\ominus$)



Standard Conditions Checklist

- ☒ Species Concentration: Unity (1 molar)
- ☒ Gas Pressure: 1 atmosphere
- ☒ Temperature: 298 K

Final Exam Summary: Anode vs. Cathode



Anode (Zinc)

Cathode (Copper)

Process	Oxidation (Loss of e^-)	Reduction (Gain of e^-)
Charge in Galvanic Cell	Negative (-)	Positive (+)
Electron Flow	Electrons move OUT	Electrons move IN
Mass Change	Electrode dissolves (mass decreases)	Metal deposits (mass increases)



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