



CHEMISTRY • CLASS 12

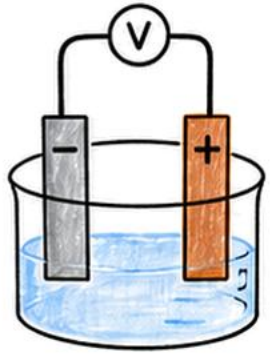
CHAPTER 2

Electrochemistry

CHAPTER NOTES

ELECTROCHEMISTRY

Electrochemistry studies the interconversion of chemical and electrical energy.



SPONTANEOUS REDOX REACTION



ELECTRICAL ENERGY



chemical $\rightarrow$ electrical

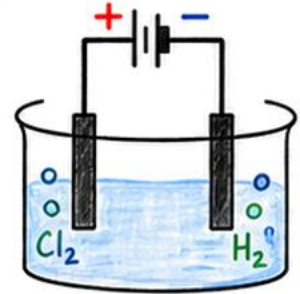


ELECTRICAL ENERGY

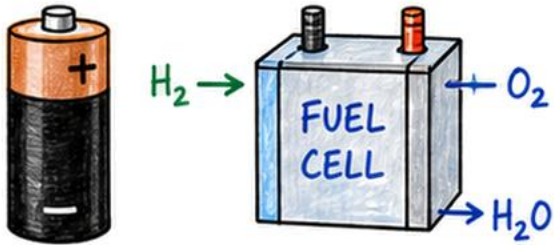


NON-SPONTANEOUS CHEMICAL CHANGE

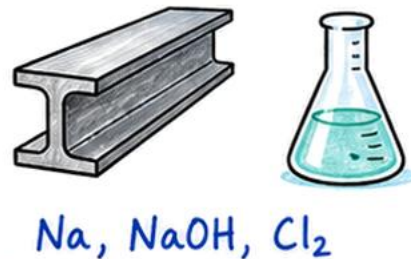
electrical $\rightarrow$ chemical



BATTERIES & FUEL CELLS



METALS & CHEMICALS



SENSORS & BIOLOGICAL SIGNALS



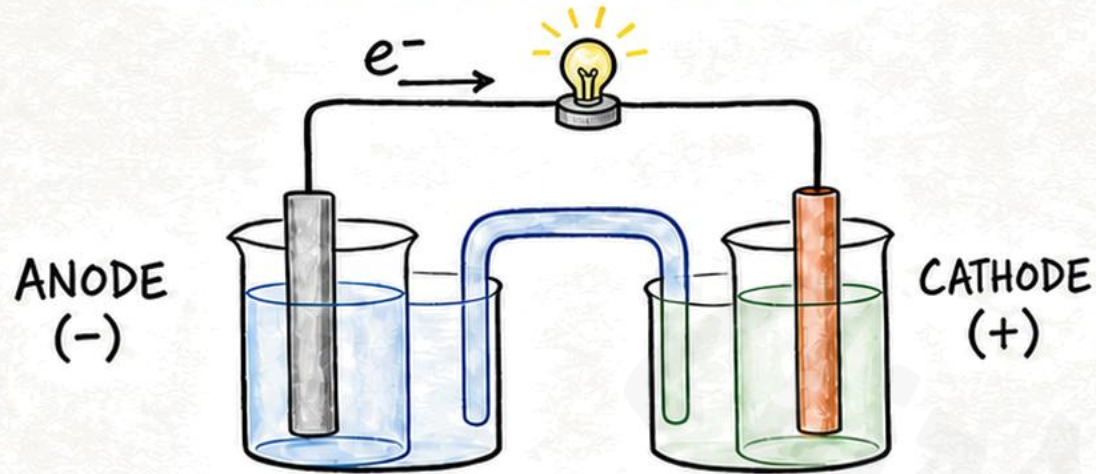
ENERGY-EFFICIENT PROCESSES



can reduce pollution depending on energy source and process

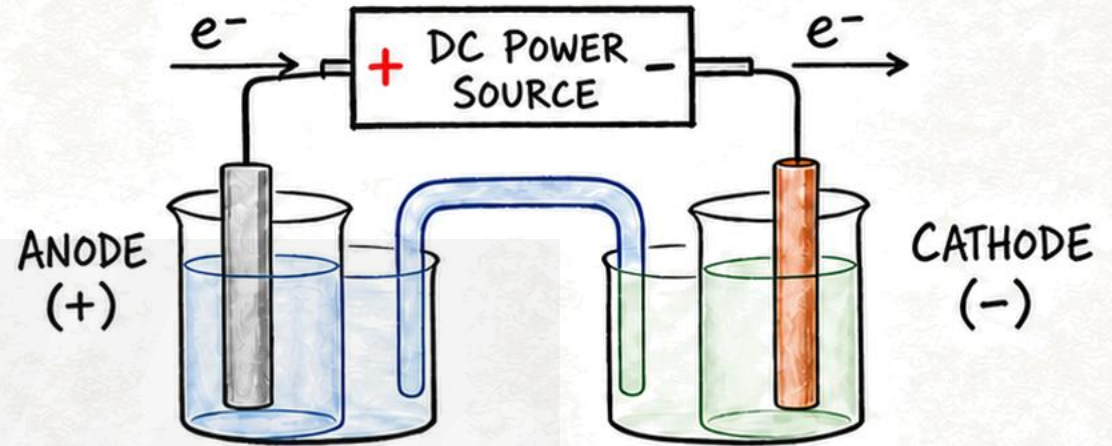
GALVANIC VS ELECTROLYTIC CELLS

GALVANIC CELL



- Spontaneous redox reaction $\Delta G < 0$
- Chemical energy $\rightarrow$ electrical energy
- ANODE (-): oxidation
- CATHODE (+): reduction
- e^- flow: anode $\rightarrow$ cathode

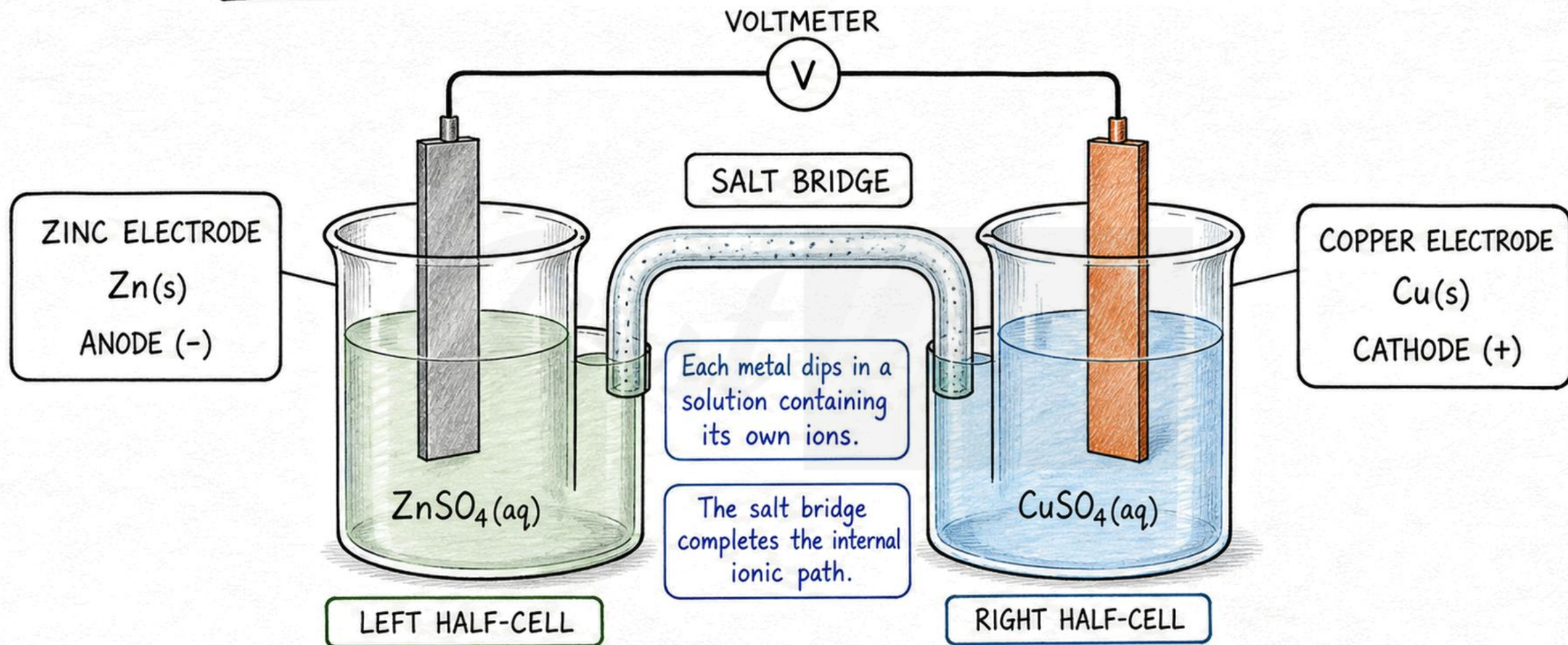
ELECTROLYTIC CELL



- Non-spontaneous reaction $\Delta G > 0$ (as written)
- Electrical energy $\rightarrow$ chemical change
- ANODE (+): oxidation
- CATHODE (-): reduction
- Power source withdraws e^- from anode and delivers e^- to cathode

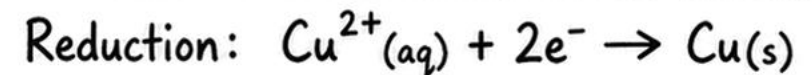
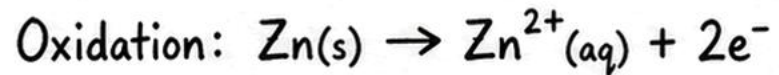
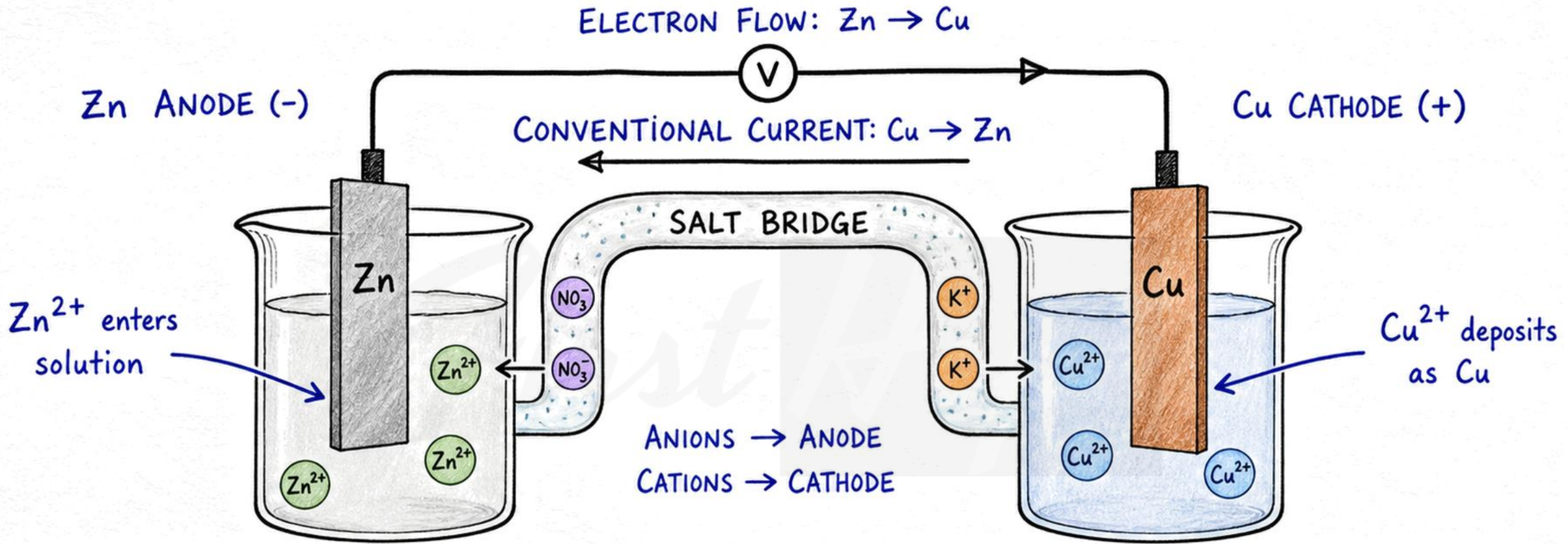
ALWAYS TRUE: oxidation at anode | reduction at cathode
Electrons travel in the external electronic path, never through the electrolyte.

DANIELL CELL - CONSTRUCTION



$$E^\circ_{\text{cell}} = 1.10 \text{ V}$$

DANIELL CELL - CHARGE FLOW



 Zn^{2+} = Zinc ion

 Cu^{2+} = Copper(II) ion

 NO_3^- = Nitrate ion

 K^+ = Potassium ion

Electrons move through the wire. Ions move through solution and salt bridge.



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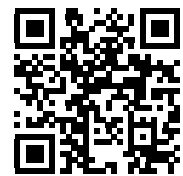


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