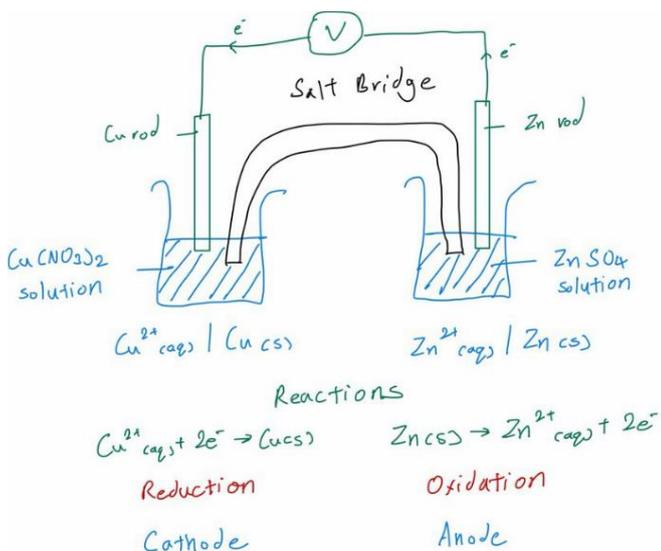


Electrochemical Cells/Simple Cells



Note: Salt bridge is meant to prevent mixing of both solutions in both half cells but still let ions pass through. Also meant to keep solutions electrically neutral, so there is no buildup of charges which could lead to reactions stopping.

The further apart in reactivity between the 2 metals, the larger the potential difference, and hence larger voltmeter reading.

How to determine reactions at each electrode

1. Identify the more reactive metal electrode. The more reactive metal's electrons will flow to the less reactive metal. Identify the cathode and the anode.
2. Identify the ions in the electrolyte, and see which ions would go to each electrode

Cations
K^+
Na^+
Ca^{2+}
Mg^{2+}
Al^{3+}
Zn^{2+}
Fe^{2+}
Pb^{2+}
H^+
Cu^{2+}
Ag^+
Au^+



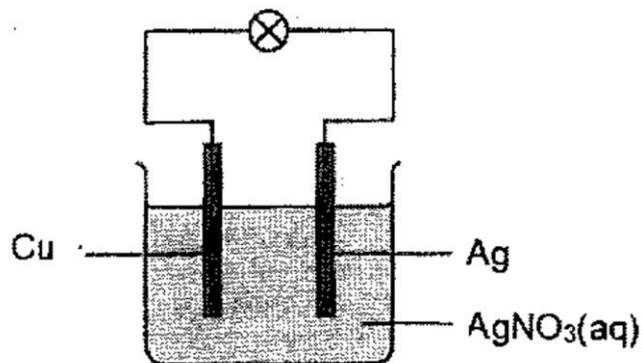
Ease of Discharge
Increases Down the Series

3. Write the half equation at each electrode.
Note: The goal is for the ion to become neutral.

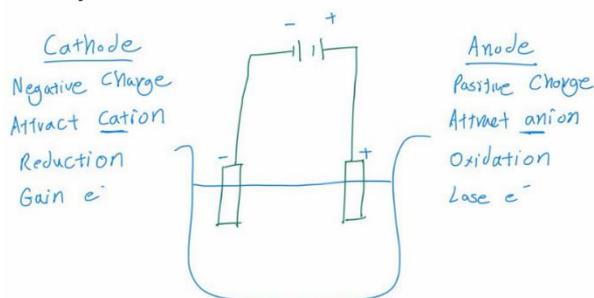
Anode: Oxidation, loss of electrons

Cathode: Reduction, gain of electrons

Example Interpretation of Electrochemical Cell:



Electrolytic Cells



How to determine reactions at each electrode

Step 1: Look at the ions and molecules in the electrolyte

- This will require looking closely at the state of the electrolyte: molten or aqueous
- Molten electrolyte has no water, while aqueous electrolyte has water

Step 2: Look at the potential ions/molecules at each electrode

Cations
K ⁺
Na ⁺
Ca ²⁺
Mg ²⁺
Al ³⁺
Zn ²⁺
Fe ²⁺
Pb ²⁺
H ⁺
Cu ²⁺
Ag ⁺
Au ⁺



Ease of Discharge
Increases Down the Series

Anions	
Dilute	Concentrated
SO ₄ ²⁻	SO ₄ ²⁻
NO ₃ ⁻	NO ₃ ⁻
F ⁻	OH⁻
Cl ⁻	F ⁻
Br ⁻	Cl ⁻
I ⁻	Br ⁻
OH⁻	I ⁻

Step 3: Look at concentrations (usually for anions/anode)

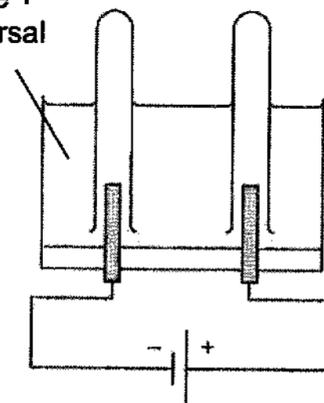
- Usually for F⁻, Cl⁻, Br⁻, when they are in higher concentrations, they can oxidise more favourably.
- For large anions like NO₃⁻, a higher concentration usually will not be enough for it to be oxidised

Step 4: Look at nature of electrode

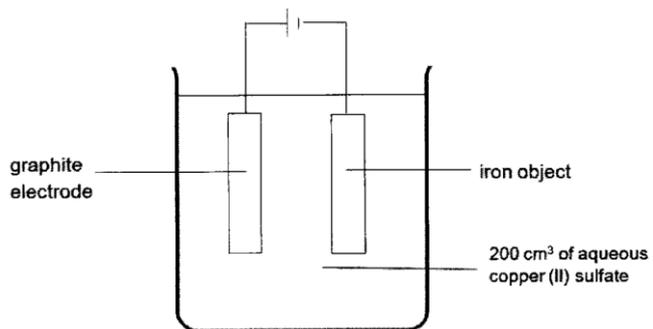
- If it is an inert electrode like Graphite or Platinum, the electrode will not be involved
- If it is an active electrode, they can participate in the reaction (usually favoured to be oxidised)

Example Interpretation of Electrolytic Cell

dilute aqueous potassium chloride + few drops of Universal Indicator



Example Interpretation of Electrolytic Cell/Electroplating:



Example Interpretation of Electrolytic Cell with concentrated solution:

