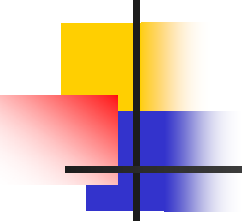
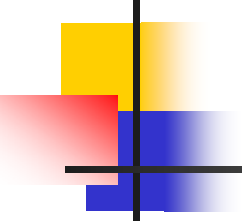


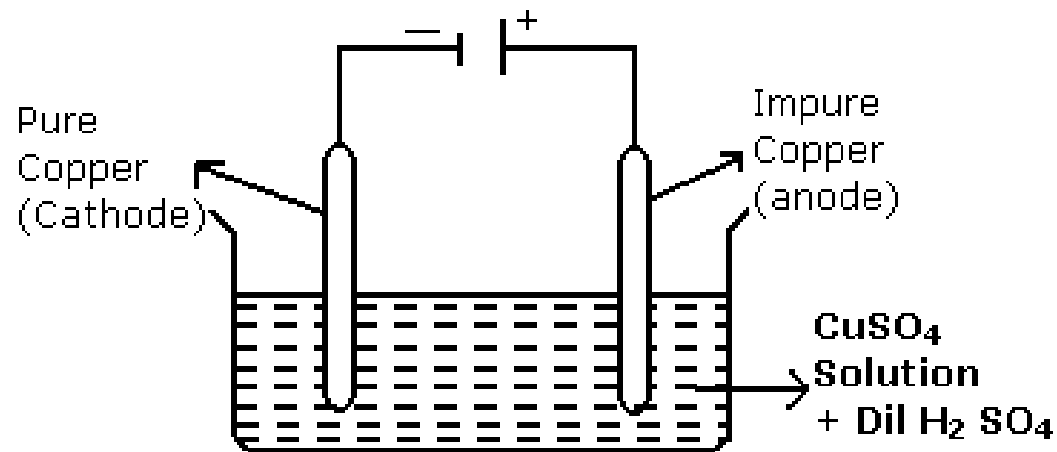


Electrolytic Cells

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-
- electrolytic cells involve non-spontaneous redox reactions
 - electrical energy from a battery causes the chemical reactions to occur

- 
-
- Positive ions from the electrolyte pick up electrons at the cathode and use them to perform reduction of the ion (reduction = addition of electrons).
 - At the same time negative ions move to the positive electrode (anode) to drop off electrons and get oxidised

- Purification of copper is achieved by electrorefining. Large slabs of crude copper serve as the anodes in the cell, and thin sheets of pure copper serve as the cathodes.

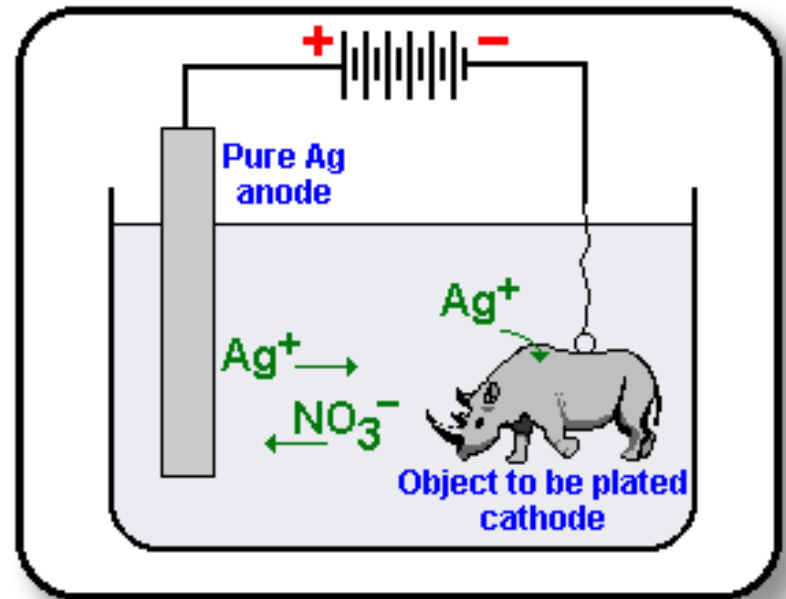




Electroplating

- gold and silver can be plated onto cheap metals.
- the object to be electroplated is attached to the negative terminal of the battery and is the cathode in the reaction.

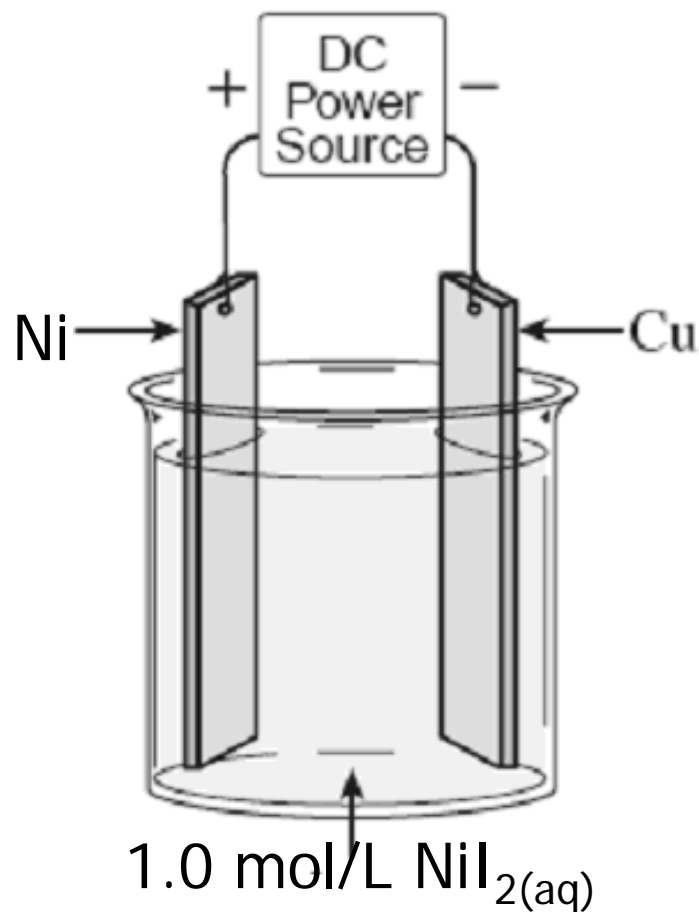
- At the anode: $\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^-$
- At the cathode: $\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$



Example

- What products would form at the anode and cathode?

	Anode	Cathode
A.	I_2	Ni
B.	Ni	I_2
C.	O_2	H_2
D.	Cu^{2+}	Ni





Solution

	Anode	Cathode
A.	I ₂	Ni
B.	Ni	I ₂
C.	O ₂	H ₂
D.	Cu ²⁺	Ni

- Oxidation at anode:
- $2\text{I}^- \rightarrow \text{I}_2 + 2\text{e}^-$

Reduction at
cathode:

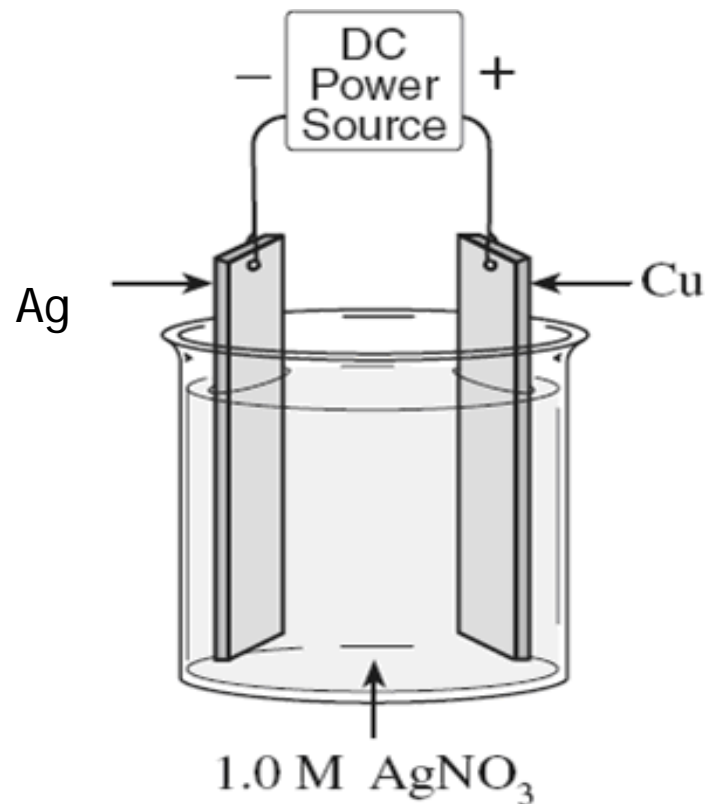


A

Example

Which of the following best describes the electrodes?

	Mass of Ag electrode	Mass of Cu electrode
A	Increases	increases
B	Increases	Decreases
C	Decrease	Increase
D	Decrease	decrease





Solution

- Reaction at cathode:

$\text{Ag}^+ + 1\text{e}^- \rightarrow \text{Ag}$ (Ag metal is coming out of solution and forming at cathode)

- Reaction at anode:

$\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$ (Cu is going into solution)

	Mass of Ag electrode	Mass of Cu electrode
A	Increases	increases
B	Increases	Decreases
C	Decrease	Increase
D	Decrease	decrease