

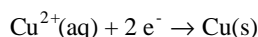
Electrochemistry

Electroplating

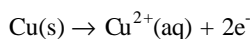
OVERVIEW

Electroplating is an economically important process, often used to reduce corrosion or improve the appearance of objects. During electroplating a thin layer of a desirable metal is deposited onto another object.

During electroplating, the object to be plated is attached to the negative post of a power source, causing the object to gain a negative charge. This will attract positive metallic cations from the electrolytic solution, or “bath”, the object is placed in. In our experiment, positive Cu^{2+} ions from the bath will become attracted to a nail carrying the negative charge. When the Cu^{2+} reach the nail they will gain electrons and become reduced to form solid copper:



The copper(II) ions removed from the bath must be replenished; this is accomplished at the anode where a solid copper plate undergoes oxidation:



PURPOSE

- To use electroplating to plate copper onto a metal object such as a nail.

SAFETY

- There are no safety concerns for this lab.

EQUIPMENT AND MATERIALS

cathode – the metal object to be plated; an iron nail works well. Or try a brass key or a quarter
anode – a copper strip
electrolytic solution – 1.0 M CuSO_4
battery or power source

beaker or glass jar
insulated wire leads with alligator clips at both ends
uninsulated copper wire
popsicle sticks or other support that will cross the top of the beaker or jar – used to suspend the item to be plated (optional)

PROCEDURE

1. The object to be plated must be clean for good results. Prepare by polishing with some steel wool.
2. Use the uninsulated copper wire to suspend the item to be plated (such as the nail) into the empty beaker. Attach one end of a wire lead to the copper wire supporting the nail and the other end to the **NEGATIVE** post of the battery or power source.
3. Place the copper strip, the anode, into the empty beaker. Attach one end of a wire lead to the copper strip and attach the other end to the **POSITIVE** post of the battery or power source.
4. Carefully pour the CuSO_4 solution into the beaker until it is about two-thirds full. If the entire nail is to be plated it must be fully submerged.
5. Allow the reaction to continue for a half-hour or so. Record your observations while electroplating is continuing.

RESULTS

- Record your observations during and after the electroplating procedure.

CONCLUSIONS AND QUESTIONS

1. Write the half-reaction that occurs at the anode of the electrolytic cell. Identify the reaction as either oxidation or reduction.
2. Write the half-reaction that occurs at the cathode of the electrolytic cell. Identify the reaction as either oxidation or reduction.
3. Write a descriptive paragraph or two that explains both the flow of copper ions and electrons through the system.

