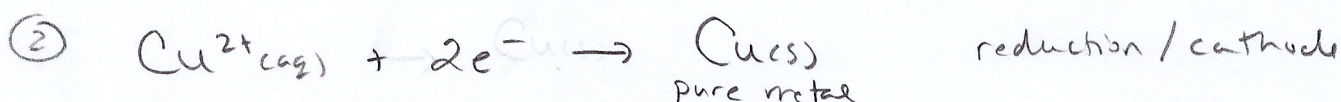
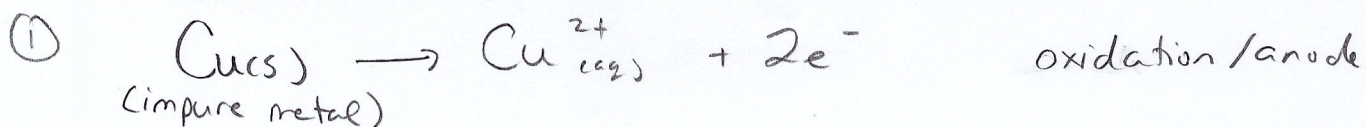
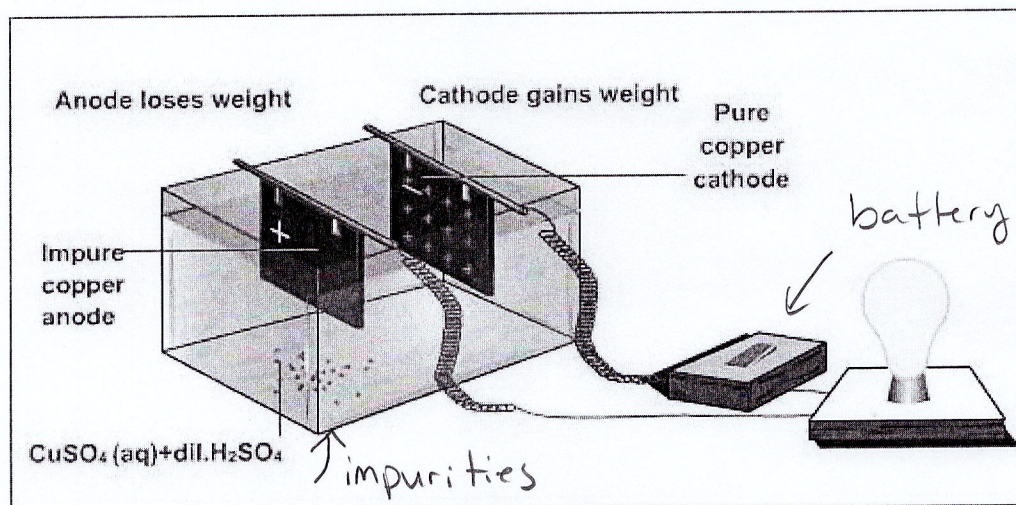


Applications of Electrolytic Cells

- Electrolytic cells are useful for rechargeable batteries as well as a few other applications
- Electrolytic cells are used in the process of metal **refining** (a process of purifying a material)
 - In this process, the anode is the impure metal (such as copper ore) and the cathode is the pure metal (such as copper)
 - During electrolysis, the impure copper anode dissolves, and the pure copper is plated onto the cathode * non-spontaneous rxn *



- This method of refining is able to create a cathode that is 99.99% pure metal
- The impurities that were present in the anode either remain in the electrolytic solution or fall to the bottom of the cell as sludge



- Another common application of electrolytic cells is electroplating
 - **Electroplating** is a technique in which a thin layer of a desired metal is used to coat or plate another object
 - Electroplating is often used to protect objects against corrosion or to improve appearance at a reduced cost
 - For example, we electroplate utensils with silver. An inexpensive metal is used to make the fork and a thin layer of silver is applied to improve appearance at a reduced cost

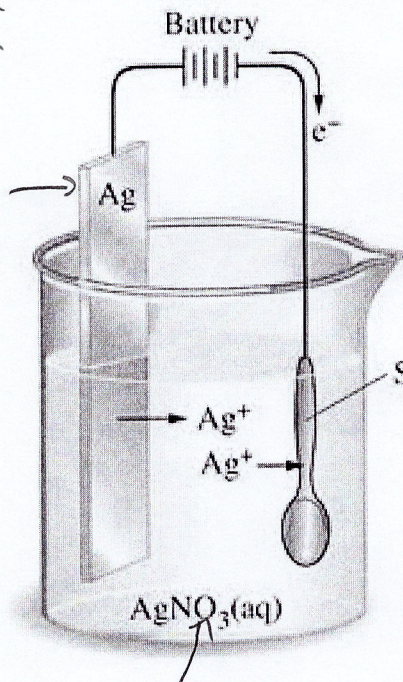
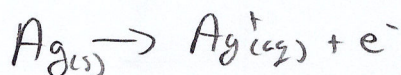
important *

- For electroplating to work, the object that is being plated/coated must be the cathode and the anode must be a metal you want to coat with (also called plating metal)
- EXAMPLE: The process for plating a spoon with silver.

* desired metal to plate with

↓
anode
(pure Ag)

oxidation:



* Spoon is being plated
↑
Cathode

reduction:



electrolyte
($\text{Ag}^+(\text{aq}), \text{NO}_3^-(\text{aq})$)

notice how the oxidation & reduction are basically the same rxn, just reverse. This is allowed b/c it is still non-spontaneous.

Now try the practice problem

Electroplating Practice Problem

An iron bar is to be electroplated with zinc. Draw and label a diagram of this electrochemical cell.

- Identify what will act as the two electrodes for the cell.
- Identify each electrode as either the anode or cathode.
- Write the half-reactions occurring at each electrode.
- Identify a solution that would make a suitable electrolyte for this cell.
- Identify which electrode will be attached to the negative post of the battery and which will be attached to the positive post.

