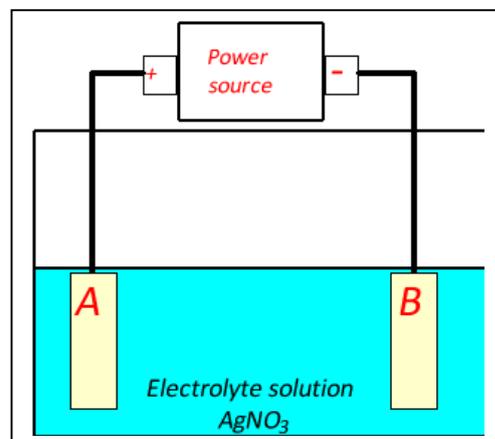


### Revision 3

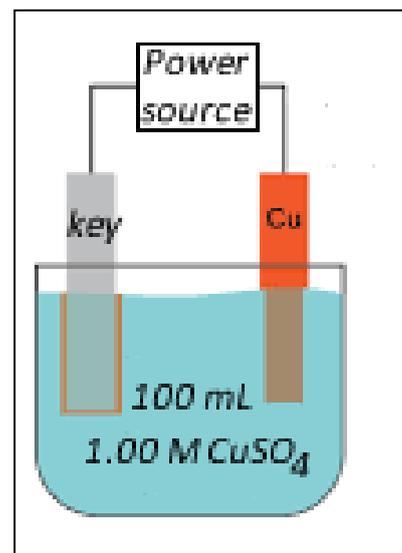
#### - Electroplating.

1) An iron spoon is to be electroplated with a layer of silver metal. An electroplating cell is set up as shown on the right.

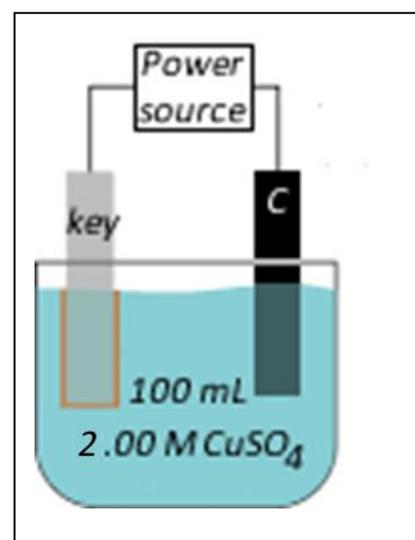


- Identify the anode and cathode.
  - What should be placed at electrode "A"?
  - What should be placed at electrode "B"?
  - On the image on the right, indicate the direction of anion and cation movement. Clearly label each.
  - How does the  $[Ag^+]$  change as the cell operates?
- f) Write the half reaction that takes place at the:
- Anode
  - Cathode
- g) The electroplating cell is left running for 2.40 hours at a current of 2.35 amps and a voltage of 10.3 volts. What mass of silver is deposited in this time?
- h) Another spoon is placed in the electroplating cell where a current of 2.35 amps is delivered. A volume of  $12.1 \text{ cm}^3$  of silver is to be plated onto the spoon. If the density of silver is  $10.5 \text{ g/cm}^3$  calculate the mass of silver .
- Calculate the number of mol of electrons needed to deposit this mass of silver
  - Calculate the time, in days, needed to deposit the required mass of silver

- 2) A new electroplating cell is set up by a student who wishes to electroplate copper metal onto his locker key.
- The setup on the right is constructed and allowed to run for 1.10 hours at a current of 5.50 amps and a voltage of 12.0 volts
- What is the concentration of the copper ions in the solution after the plating?
  - What mass of copper, in grams, is deposited on the key.



- Another student devised the setup shown on the right. What is the concentration of the copper ions in the solution after the plating?



- 3) A metal consisting of a mixture of metals forms one of the electrodes of an electroplating cell, the other electrode is composed of carbon. The mixture of metals includes iron, copper, tin, zinc and gold. The cell voltage is set so that tin only is deposited at the carbon electrode, all other metals are either dissolved as cations in the solution or fall to the bottom as a sludge.
- What metals can be found in the solution as cations. Explain
  - What metals should be found in the sludge? Explain

