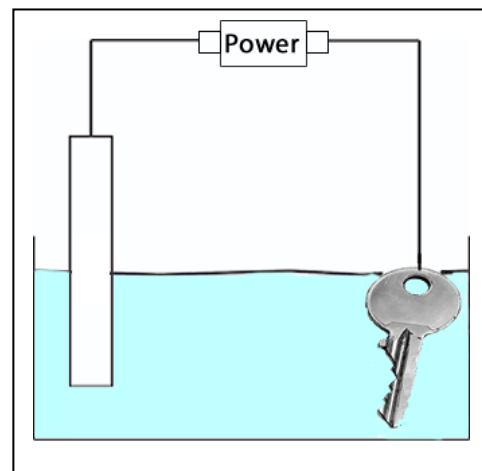


Video worksheet – electroplating

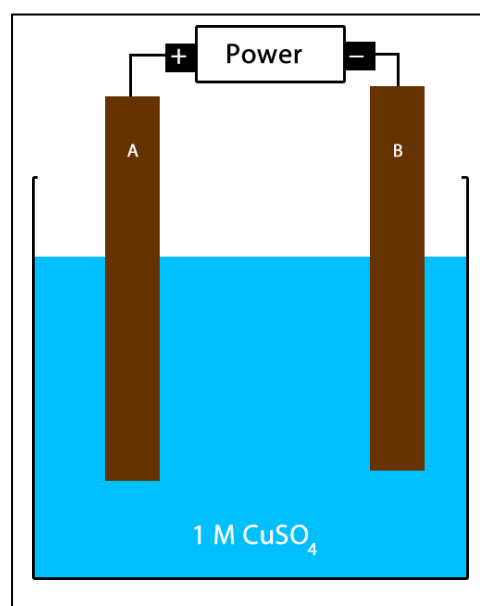
1. Consider the electrolytic cell shown below. A key is to be plated with a thin layer of Nickel (Ni) metal.
  - a. Label the:
    - electrode that is the anode and give its polarity
    - direction of electron flow by placing an arrow in the box provided.
  - b. Write the balanced equation, states included for the reaction taking place at the :
    - anode
    - cathode
  - c. Give an appropriate electrolyte.
  - d. What material is the anode made of?



2. What mass, in grams, of nickel could be electroplated from a solution of nickel(II) chloride by a current of 0.250 amps flowing for 10.00 hours? Give the answer to the right number of significant figures.

3. Below is an electroplating setup whereby a metal iron rod is to be covered with a layer of copper.

- a. Identify the rod to be covered in copper.
- b. Give the material that the positive electrode is made of.
- c. Give the balanced equation, states included, for the reaction taking place at the:
  - anode \_\_\_\_\_
  - cathode \_\_\_\_\_
- d. Give the chemical consequences if electrode "A" was replaced with an iron electrode by:
  - i. Writing the balanced reaction taking place at the anode and cathode as soon as the electrolytic cell is turned on.
  - ii. Writing the balanced reaction taking place at the anode and cathode after the electrolytic cell has been allowed to run for a while.

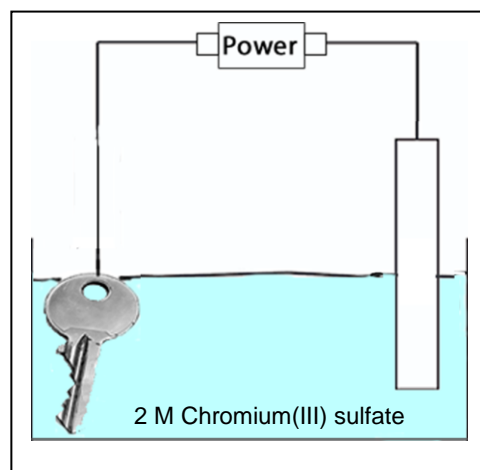


4. An electroplating cell containing two platinum electrodes and an electroplating solution is operated at 5.0 A for 600 s. After the cell is turned off, 0.91 g of metal is found to have been deposited on the cathode.

Which electroplating solution was used in this process?

- A. 1 M  $\text{AgNO}_3$
- B. 1 M  $\text{Ni}(\text{NO}_3)_2$
- C. 1 M  $\text{Pb}(\text{NO}_3)_2$
- D. 1 M  $\text{Cr}(\text{NO}_3)_3$

5. A key with a surface area of  $8.52 \text{ cm}^2$  is to be plated with chromium metal to a depth of 0.0200 mm. Calculate the time, in seconds, required to plate this key if the cell operates at a current of 5.14 amps. Give the answer to the right number of significant figures. (*Density of chromium metal =  $7.2 \text{ g/cm}^3$* )



6. Consider the three electroplating cells connected in series, shown below. A current of 3.45 amps flows through the circuit for 3.00 hours. Which electrode will have the greatest mass of metal deposited? Justify your selection by calculating the mass of the metal, in grams, to the right number of significant figures.

