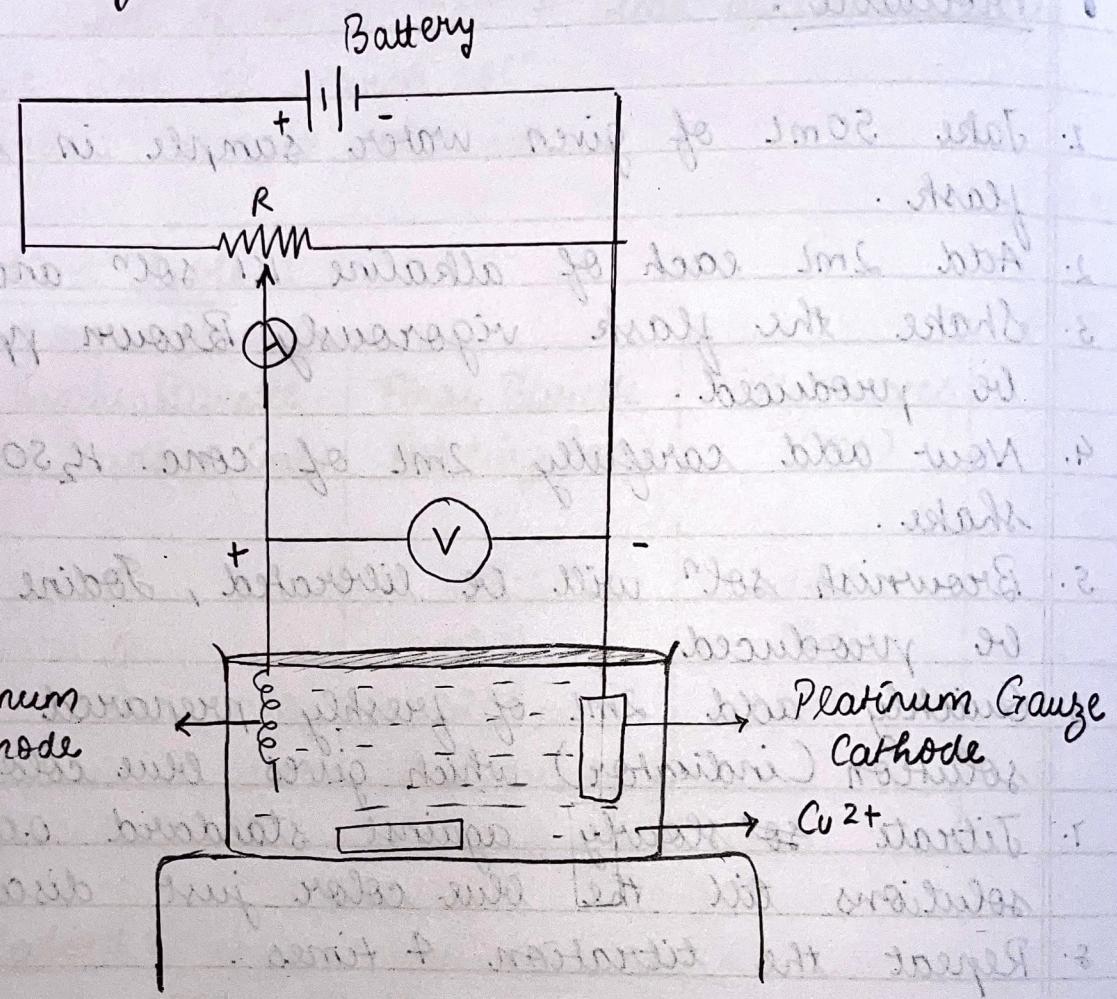


- Aim: To study electro-deposition of Cu on cathode
- Apparatus Required: Electrolytic cell, battery, rheostat, ammeter, $CuSO_4$ soln & other solutions.
- Procedure:
 1. Check the gauge electrode given to you. Consult the instructor if it needs any pretreatment. If necessary give the treatment as it is to be given for spiral platinum anode. Dry it in oven & weight accurately.
 2. Clean the platinum spiral in 1:1 KNO_3 soln for 3-4 minutes. Wash with tap water and then distilled water.
 3. Take exactly 150mL of 2% copper sulphate soln with a burette into 250 mL beaker. The given soln already contains 5mL conc H_2SO_4 & conc. HNO_3 which acts as a depolarizer. Add about 50mL of distilled water.
 4. Arrange the circuit as shown in the circuit diagram. Be sure that the gauge cathode is connected to the negative terminal & platinum spiral anode is connected to the +ve terminal of the power source, as in the circuit diagram. Complete the circuit by plugging in the switch key & raise the beaker containing the electrolyte until the cathode is completely immersed in the

Circuit Diagram



R - resistor , A - ammeter , V - voltmeter

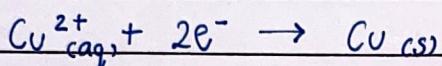
electrolyte. Adjust the rheostat such that the current reading, on the ammeter is about 0.2A. Be sure that the electrodes are not short-circuited & that the magnetic, paddle does not hit either of the electrodes.

5. Stir the solution vigorously with magnetic stirrer. Continue the electrolysis until blue color of solⁿ has entirely disappeared (This will take about 45 mins). Reduce the current to 0.1A. By adjusting rheostat, add 1.0g of urea and continue the electrolysis for another 5 mins. Test the completion of copper deposition by taking a drop test solⁿ with glass rod on a filter paper & placing drop of conc. NH_3 solⁿ close to it. Where the boundaries of the two solⁿ meet, a blue color will be formed if the solⁿ contains copper, if no such blue color is observed; it is an indication that all Cu^{2+} ions reduced to Cu^{\equiv} & deposited on the cathode.
6. To stop electrolysis, turn off magnetic stirrer. Remove the support under beaker and slowly lower the beaker with one hand, while washing the exposed portion of the cathode with distilled water. As soon as the cathode is completely out of solⁿ, cut off the current. Remove the cathode, wash it thoroughly with distilled water & then dip it in a beaker of acetone. Place it on a watch glass & keep it in an electric oven for 2-3 mins

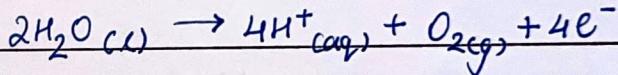
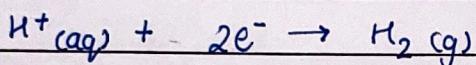
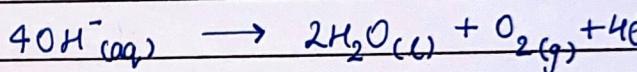
Cool the electrode to room temperature in desiccators and then weight accurately.

- Reactions :

At Cathode



At Anode



- Results :

- 150 mL of the given stock soln contains 0.44 g of Cu.
- Amount of Cu in 1L of the given stock soln = 2.93 g

Observations :

1. Wt. of platinum gauze electrode = 12.24g (W₁)
2. Wt. of platinum + Cu deposited = 12.68g (W₂)
3. Wt. of Cu deposited = W₂ - W₁ = 0.44g (W₃)

4. Current employed = 0.1A

5. Duration of electrolysis = 2700s

6. Vol. of stock copper soln taken 150mL

Calculation:

Wt. of Cu present in 150mL of given = 0.44g (W₃)

Stock soln of CuSO₄ →

$$\frac{W_3 \times 1000}{150} = \frac{0.44 \times 1000}{150} = \underline{\underline{2.93g}}$$