**Name** :

**Day, date perform** :

# Electrolysis

**Objectives:**

In this practical, you will carry out the electrolysis of copper(II) sulfate solution. The outcomes of the experiment provide the opportunity to introduce a discussion about electroplating and the industrial electrolytic refining of copper

**Background:**

Electrolysis is breaking down an electrolyte (molten or solution) into its constituents by means of electricity. An electrolyte is substance in molten or aqueous that conduct electricity. An electrolyte can be molten ionic compounds, ionic solutions, acid solutions or alkali solutions.

**Apparatus and materials needed:**

*Materials:*

1. Aqueous Copper (ii) sulfate, 2 mol.dm-3
2. Aqueous calcium chloride, 2 mol.dm-3
3. Aqueous calcium chloride, 0.01 mol.dm-3

*Apparatus:*

1. Carbon rods as electrodes
2. Copper strip as electrodes
3. A pair of crocodile cables
4. D.C. power supply
5. Litmus paper
6. pH paper

*Draw the set up diagram of the electrolysis on the space below.*

**Procedures**

*A. Electrolysis of copper (ii) sulfate using Carbon electrodes*

Procedures: (listen to the teacher's instruction, then write the procedures clearly.)

Guide Questions:

Electrolysis of copper (ii) sulfate using inert/ carbon electrodes

1. What do you observe at (a) the negative electrode (cathode) and (b) the positive electrode (anode)
   Cathode:

   Anode:

2. Write the ionic equations for the reactions at the two electrodes.
   Cathode:

   Anode :

3. Name the product formed at (a) the cathode and (b) the anode

Cathode:
Anode :

*B. Electrolysis of copper (ii) sulfate using copper electrodes*

Procedures:

Do the same procedures as the previous procedures. Use copper electrodes instead of carbon electrodes (weigh each electrodes before you set up or connect them to the crocodile cables). Pour the fresh aqueous copper (ii) sulfate in to the beaker provided. Dip the electrodes into the solutions then switch on the D.C. current. Observe the electrodes while the electrolysis is on. After several minutes (more than 5 minutes or there are any changes at each electrodes), switch it off.

Remove the electrodes from the solution let it dry, then weigh the electrodes. Compare the weight of the electrodes after the electrolysis are the any changes of their mass?

| **Electtrode** | **Mass (gram)** | |
|---|---|---|
| | **Before electrolysis** | **After Electrolysis** |
| Cathode (negative) | | |
| Anode (positive) | | |

Electrolysis of copper (ii) sulfate with copper electrodes

1. What do you observe at (a) the negative electrode (cathode) and (b) the positive electrode (anode)
   Cathode:

   Anode:

2. Write the ionic equations for the reactions at the two electrodes.
   Cathode:

Anode :

3. You notice that the negative electrode (copper cathode), its mass is ***the same / increased / decreased*** *). This is because….

4. You notice that the positive electrode (copper anode), ), its mass is ***the same / increased / decreased*** *). This is because….

5. Name product are formed at (a) the cathode and (b) the anode
   Cathode:

   Anode :

6. Could this method of using metals instead of inert electrodes can be used in electroplating and refining copper? Explain your reaseons

**CONCLUSION:**