



Chem!stry

Name: ()

Class:

Date: / /

Chemistry SPA Skill 3 – Planning an Experiment

To Investigate How the Mass of Copper Deposited at the Cathode During the Electrolysis of Aqueous Copper(II) Sulfate Varies with the Current that Flows Through the Circuit

Aim:

In this question you will be assessed on your ability to plan a procedure to carry out an experiment.

Description:

The number of moles of electrons that flow through an electric circuit is given by the equation:

$$\text{Moles of electrons} = (I \times T) \div 96\,500$$

I = current measured in amps

T = time measured in seconds

During the electrolysis of aqueous copper(II) sulfate, copper is deposited at the cathode according to the following ionic half-equation:



It can be seen from this equation that one mole of copper is deposited by two moles of electrons.

Design an experiment to investigate how the mass of copper deposited at the cathode varies with the current that flows through the circuit.

Apparatus and Chemicals:

You are provided with the following apparatus and reagents

Strips of copper metal	Graphite electrodes	Copper(II) sulfate solution of concentration 1.0 mol/dm ³
Copper(II) sulfate solution of concentration 2.0 mol/dm ³	Distilled water	250 cm ³ Beaker
500 cm ³ Beaker	50 cm ³ Measuring cylinder	100 cm ³ Measuring cylinder
250 cm ³ Conical flask	Evaporating basin	Spatula
Glass rod	-10 to +110 °C Thermometer	Weighing machine
Stopwatch	Test tubes and test tube rack	Wires and crocodile clips
Ammeter	Batteries / variable power supply	Delivery tube with stopper
Boiling tubes	Retort stand and clamp	Filter funnel and filter paper

In addition to this, you may also use any other apparatus that is commonly available in the laboratory.

Plan:

In your plan you should

- a) Give a hypothesis or problem statement for the experiment.
- b) Identify the important variables and state which one(s) will be changed and which ones will be kept constant.
- c) Give a brief outline as to how you will conduct the experiment.
- d) List the apparatus and reagents that you will need in order to perform the experiment.
- e) Draw a labelled diagram to show how the apparatus will be setup.
- f) Write out your suggested method as a series of step-by-step instructions.
- g) Describe how the experimental results should be processed in order to complete the experiment.
You are expected to include a results table, but are not required to include any data.
- h) Identify a key source of error and state how it will affect your results.

- Scan the QR code given below for the answer to this assignment:



http://www.chemist.sg/purification/electrolysis_ans.pdf