

Surname	Centre Number	Candidate Number
First name(s)		0



GCSE



S25-3410U30-1C

MONDAY, 6 JANUARY – FRIDAY, 21 FEBRUARY 2025

CHEMISTRY – Unit 3 (3410U30)

PRACTICAL ASSESSMENT

INVESTIGATING THE ELECTROLYSIS
OF COPPER(II) SULFATE

SECTION A

1 hour

For Examiner's use only		
	Maximum Mark	Mark Awarded
Section A	6	

ADDITIONAL MATERIALS

A calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The total number of marks available for this section of the task is 6.

The number of marks is given in brackets at the end of each question or part-question.

This task is in 2 sections, **A** and **B**. You will complete Section **A** in one lesson and Section **B** in the next science lesson.

JUN253410U301C01

Introduction

Your task is to investigate the effect of electrode length on the electrolysis of copper(II) sulfate solution.

Apparatus Required

The following apparatus is required for each group: (each group should consist of no more than three candidates).

eye protection

1 × 250 cm³ beaker

1 × d.c. power supply set at 6 V

1 × ammeter

1 × 250 cm³ measuring cylinder

3 × connecting wire

2 × crocodile clip

2 × copper foil electrode (1 cm width)

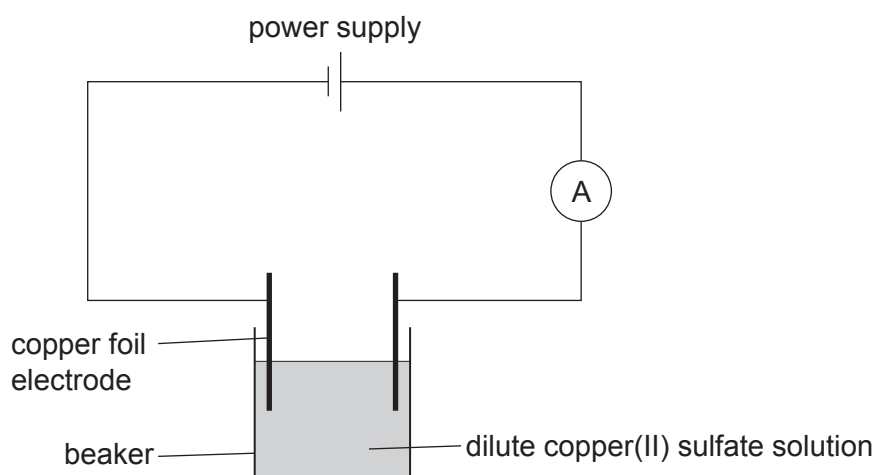
200 cm³ of dilute copper(II) sulfate solution (0.5 mol/dm³)

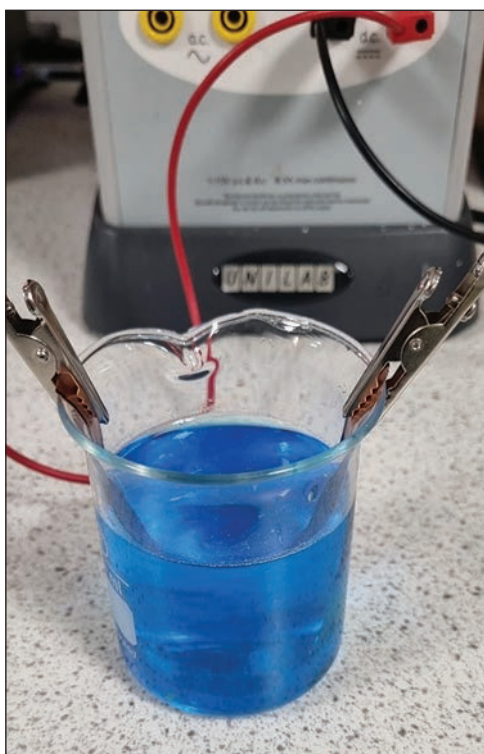
Access to:

waste bowl

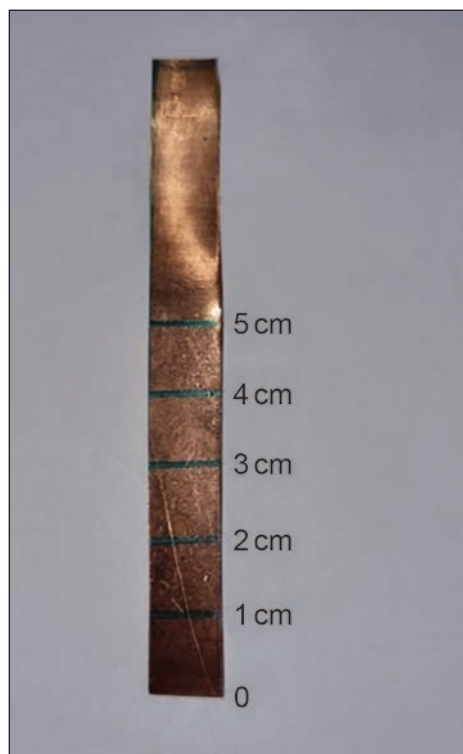
CLEAPSS student safety sheet: 40 – Copper and its compounds. This is provided on page 6 of this examination paper.

Diagram





Electrodes clipped to sides
of the beaker



Copper foil electrode

Read the method and answer questions 1.(a) and 1.(b) before carrying out the experiment and recording your results.

Method

1. Wear eye protection.
2. Use the measuring cylinder to measure 200 cm^3 of dilute copper(II) sulfate solution into the beaker.
3. Clip the copper foil electrodes, using the crocodile clips, to opposite sides of the beaker containing dilute copper(II) sulfate solution so that 5 cm of each electrode is immersed.
4. Connect the electrodes and the ammeter to the power supply.
5. Switch on the power supply, measure and record the current **immediately**.
6. Switch off the power supply.
7. Repeat steps 5–6 two more times to give a total of three results.
8. Repeat steps 3–7 adjusting both electrodes so that the following lengths are immersed in the dilute copper(II) sulfate solution: 4 cm, 3 cm, 2 cm and 1 cm.
9. Pour the contents of the beaker into the waste bowl and wash your hands.



SECTION A**Answer all questions.**

1. (a) State a hypothesis for this experiment. [1]

.....

.....

- (b) Complete the risk assessment below for dilute copper(II) sulfate solution in this experiment. [1]
Use the student safety sheet on page 6 of this examination paper.

HAZARD	RISK	CONTROL MEASURE
Dilute copper(II) sulfate solution is an irritant		

You may record raw results in the space below.



(c) Present your results in a table. Include all of your results.

[4]

Examiner
only

END OF PAPER

6



Student safety sheets

40

Copper and its compounds

including Copper oxides, carbonate, sulfate, chloride, nitrate

Substance	Hazard	Comment
Copper (metal)	Currently not classified as hazardous	Sharp edges can present a risk of cuts. Granulated copper may be classified by some suppliers as toxic to aquatic life with long lasting effects.
Copper(I) oxides (Cuprous oxides) Copper(II) oxides (Cupric oxides)	   CORR.* IRRITANT ENVIR.	DANGER. Copper(I) oxide: *causes serious eye damage; skin irritant; harmful if swallowed/inhaled; toxic to aquatic life. WARNING. Copper(II) oxide: causes serious eye irritation; skin irritant; harmful if swallowed/ inhaled; toxic to aquatic life.
Copper(II) carbonate hydroxide (Basic copper carbonate, malachite)	  IRRITANT ENVIRONMENT	WARNING. Copper(II) carbonate hydroxide: causes serious eye irritation; skin irritant; harmful if swallowed/inhaled, toxic to aquatic life. Also known as malachite.
Copper(II) sulfate Copper(II) nitrate Solids and concentrated solutions	   CORR. IRRITANT ENVIR.*	DANGER. Solids and solutions ($\geq 1.0 \text{ mol/dm}^3$ sulfate , $\geq 1.3 \text{ mol/dm}^3$ nitrate): cause serious eye damage; skin irritant; harmful if swallowed (especially saturated solutions for crystal-growing). *Solid only: very toxic to aquatic life. Water added to anhydrous solid copper(II) sulfate(VI) produces heat.
Copper(II) sulfate Copper(II) nitrate Dilute solutions	  CORROSIVE IRRITANT	DANGER. Sulfate ($< 1.0 \text{ mol/dm}^3$ and $\geq 0.2 \text{ mol/dm}^3$) and nitrate ($< 1.3 \text{ mol/dm}^3$ and 0.2 mol/dm^3): skin irritant; cause serious eye damage. WARNING. Sulfate ($< 0.2 \text{ mol/dm}^3$ and 0.02 mol/dm^3) and nitrate ($\geq 0.15 \text{ mol/dm}^3$ and 0.05 mol/dm^3): skin and eye irritant. Currently not classified as hazardous. Sulfate ($< 0.02 \text{ mol/dm}^3$) and nitrate (0.05 mol/dm^3). Benedict's solution and Fehling's solution both contain dilute copper(II) sulfate but Fehling's solution has other hazards.
Copper(II) chloride Solid	  IRRITANT ENVIRONMENT	WARNING. eye and skin irritant; harmful if swallowed; toxic to aquatic life.
Copper(II) chloride Solutions (if 0.8 mol/dm^3 or more)	 IRRITANT	WARNING. Eye and skin; harmful if swallowed ($\geq 1.8 \text{ mol/dm}^3$).
Copper(II) chloride Solution (if less than 0.8 mol/dm^3)	Currently not classified as hazardous	

Typical control measures to reduce risk

- Wear eye protection.
- Use the lowest concentration possible.
- Avoid raising dust, e.g. by dampening powders.
- Take care if evaporating solutions to dryness.

Assessing the risks

- What are the details of the activity to be undertaken? What are the hazards?
- What is the chance of something going wrong?
e.g. Solutions spurting out of test tubes when heated or solutions decomposing to toxic products when heated to dryness.
- How serious would it be if something did go wrong?
e.g. Are there hazardous reaction products (such as chlorine from the electrolysis of copper chloride)?
- How can the risk(s) be controlled for this activity?
e.g. Can it be done safely? Does the procedure need to be altered? Should goggles or safety spectacles be worn?

Emergency action

In all emergency situations, alert the responsible adult immediately. Be aware that actions may include the following:

- **In the eye** Irrigate the eye with gently-running tap water for at least 20 minutes. Call 999/111.
- **In the mouth/swallowed** Do no more than rinse and spit with drinking water. Do **not** induce vomiting. Call 999/111.
- **Dust breathed in** Remove the casualty to fresh air. Consult a medic if breathing is difficult.
- **Spilt on the skin or clothing** Remove contaminated clothing. Irrigate the affected area with gently-running tap water for at least 20 minutes. Call 999/111 as appropriate. Rinse clothing.
- **Spilt on the floor, bench, etc** Scoop up solid (take care not to raise dust). Wipe up small solution spills or any traces of solid with cloth; for larger spills use mineral absorbent (e.g. cat litter).



[illegible]

BLANK PAGE

**PLEASE DO NOT WRITE
ON THIS PAGE**

