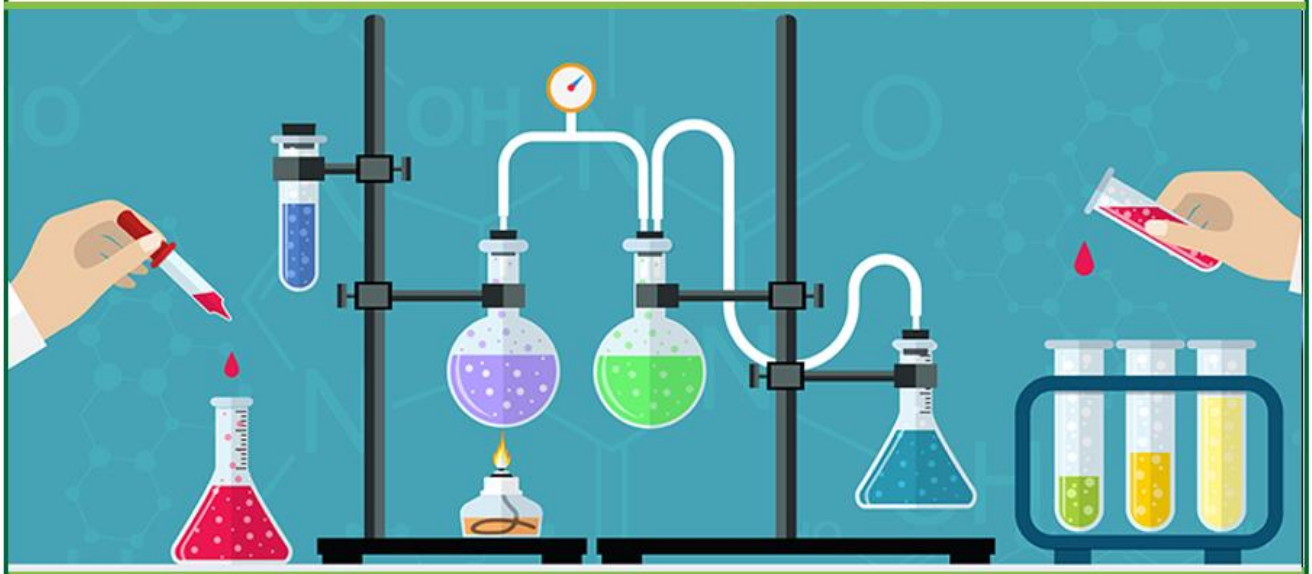
Bentley Wood
High School for Girls

Chemistry

Year 10 into 11 Bridging Work

2026



Name:_____

Tutor Group: _____

Teacher: _____

Year 10 into 11 Chemistry Bridging Work

Congratulations on completing Year 10 and entering the final stage of your chemistry journey! This bridging work will help you review and reinforce key ideas from Year 10, ensuring a supported transition into Year 11.

There are three sections to this booklet. These are:

1. Reviews three Required Practical you have covered so far in chemistry with an opportunity to review different aspects of individual practical work;
2. Exam Question Practice – get into the mindset of an examiner! Practice some commonly tested exam questions in chemistry with top tips from our exam board, AQA.
3. Numeracy and Working Scientifically Skills Quiz on Educake

Together with this, there will be links to useful videos that directly link to the module/topic in case you need further support. Please also use your CGP and Kerboodle textbooks to support with your revision. Recommended Websites:

- Savemyexams
- BBC Bitesize
- AHammondBiology
- Thesciencehive

This is the first piece of work you will be assessed in September and will set the tone for the rest of the academic year. It's an opportunity for you to showcase your knowledge, skills, and growth since Year 10. Work hard, stay focused, and demonstrate what you are capable of achieving.

Section 1: Required Practicals

Recommended Videos (remember reactants / reagents can vary and will not always be the same!):

1. Preparation of a pure, dry salt
    a. Making Salts - GCSE Science Required Practical
    b. GCSE Chemistry - Neutralisation Reactions
2. Electrolysis
    a. Electrolysis - GCSE Science Required Practical
    b. GCSE Chemistry - Electrolysis Part 3 - Aqueous Solutions
3. Temperature Changes
    a. Temperature Changes - GCSE Science Required Practical
    b. AQA GCSE Science Revision Chemistry "Required Practical 4: Temperature Changes

For any practical activity can students answer these 10 questions?

1. What is the dependent variable and the independent variable?
2. Therefore, what other factors could affect the results and need to be controlled (control variables)?
3. What will I measure or record?
4. What would an appropriate experimental control be?
5. How could I improve the accuracy of my experiment/investigation?
6. How could I improve the precision of my experiment/investigation?
7. How could I improve the validity of my experiment/investigation?
8. What else could I do with this experiment? What could I change to investigate something else?
9. What is my greatest source error?
10. What pattern or trend do my results show and how do I explain this?

Please note because not all investigations have all these characteristics, not all of these questions can be answered for all Required Practicals.

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Equipment

Learning Objectives -

- React sulfuric acid with insoluble copper (II) oxide to prepare an aqueous (aq) solution of the salt copper sulfate
- Separate out unreacted copper (II) oxide by filtration
- Prepare pure dry crystals of copper sulfate from the solution.

Soluble salts (aq) have a negative and positive ion

Copper Sulfate Salt - $CuSO_4$

positive ion (metal): Cu^{2+} negative ion (sulfuric acid): SO_4^{2-}

You need to know how the practical is applied to the oxide or hydroxide:
- copper oxide
- copper hydroxide
- copper carbonate

Method:

As we start with a fixed volume of sulphuric acid, this is the limiting reactant, meaning the acid will run out – essential to avoid contaminating the salt with excess acid.

Making the soluble salt

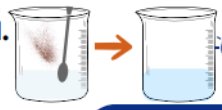
1) Measure 40 cm³ sulfuric acid and put it into the 100 cm³ beaker .

2) Set up the Bunsen burner, tripod, gauze and heatproof mat. Put the beaker on the gauze and heat the acid gently until it is almost boiling. Turn off the Bunsen burner.

Heating increases rate of reaction

Do not boil because it cause boil over edges when copper (II) oxide is added, causing a hazard

3) Remove the glass beaker from the tripod. Use the spatula to add a small amount of copper (II) oxide powder to the hot acid. Stir with the glass rod. The copper (II) oxide will disappear and the solution will turn clear blue.



This is copper sulfate

The type of salt depend on the acid:
- Sulfuric acid – metal sulfate
- Nitric acid – metal nitrate
- Hydrochloric acid – metal chloride

REQUIRED PRACTICAL 1
MAKING SALTS

Reaction with copper oxide:

$$CuO_{(s)} + H_2SO_{4(aq)} \longrightarrow CuSO_{4(aq)} + H_2O_{(l)}$$

Reaction with copper hydroxide:

$$Cu(OH)_{2(s)} + H_2SO_{4(aq)} \longrightarrow CuSO_{4(aq)} + H_2O_{(l)}$$

4) Add some more copper (II) oxide and stir again.

5) Keep adding the copper (II) oxide until some of it remains after stirring.

The reaction stops when all of the acid has reacted – the solution is copper sulfate (neutral).

Removing the unreacted copper oxide.

6) Allow the apparatus to cool completely.

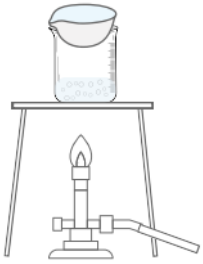
We can filter it away because the excess copper oxide is insoluble whereas the copper sulfate is soluble, so will go down the filter.

7) Set up the filter funnel and filter paper over the conical flask. Filter the contents of the 100cm³ beaker.

Making pure crystals of copper sulfate using evaporation

8) Pour the filtrate from the conical flask into the evaporating basin.

9) Set up a water bath using the 250 cm³ beaker on the tripod and gauze.



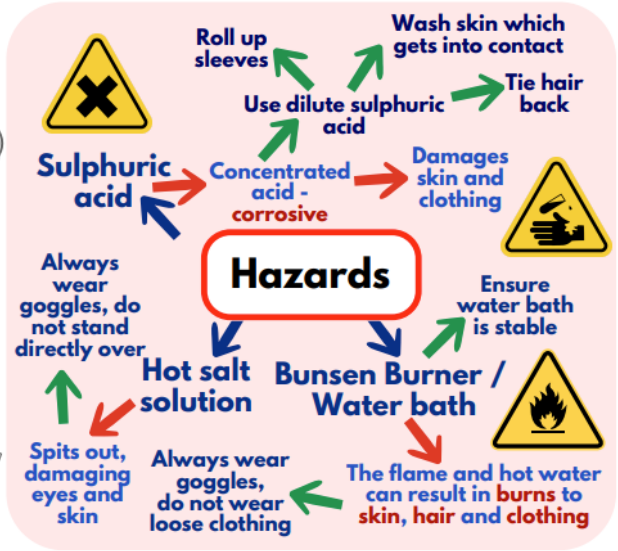
10) Evaporate the filtrate gently using the water bath.

11) When crystals start to form and half of the solution remains, stop heating the water bath.

12) Pour the remaining solution into the crystallising dish.

13) Leave the crystallising dish in a cool place for at least 24 hours.

14) Remove the copper sulfate crystals from the concentrated solution with a spatula. Gently pat the crystals dry between two pieces of filter paper.



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Exam Style Questions - Making Salts

1. A student adds copper(II) oxide to warm sulfuric acid to make copper sulfate. Why is it important to warm the acid but not boil it? (2 marks)

2. During the experiment, the student adds excess copper(II) oxide.
a) Why is excess copper(II) oxide added?
b) How is the unreacted copper(II) oxide removed? (4 marks).

3. Describe how a student would obtain pure, dry crystals of copper sulfate after filtering the solution. (4 marks)

4. State two safety precautions a student should take when carrying out this practical and explain why. (4 marks)

5. A student used 40 cm^3 of sulfuric acid. Suggest what would happen if they used more acid than needed. (2 marks)

6. Write a word equation for the reaction between copper(II) oxide and sulfuric acid. (1 mark)

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REQUIRED PRACTICAL 2
ELECTROLYSIS

Equipment

Learning Objectives -

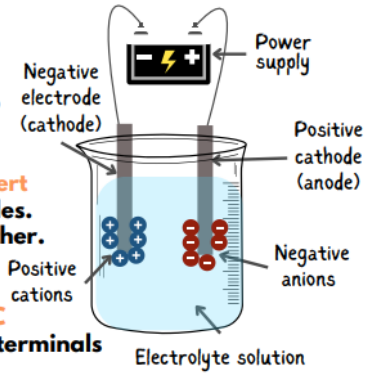
- Use a low voltage power supply and carbon rod electrodes to pass a current through two different salt solutions.
- Identify the element formed at the positive and negative electrodes for each solution.
- Add extra detail to a basic electrochemical diagram.

Method:

1) Pour approximately 50 cm³ copper (II) chloride solution into the beaker.

2) Add the petri dish lid and insert the carbon rods through the holes. The rods must not touch each other.

3) Attach crocodile leads to the rods. Connect the rods to the DC (direct current - red and black) terminals of a low voltage power supply.



4) Select 4V on the power supply and switch on.

5) Look at both electrodes and record your initial observations in the table below.

6) Use forceps to hold a piece of blue litmus paper in the solution next to the anode (positive electrode) and identify the element. Write all observations in a table.

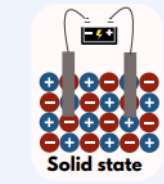
7. Rinse the electrochemical cell apparatus and collect a new set of electrodes. Repeat steps 1-8 using the sodium chloride solution.

Safety - Switch off the power supply after 5 minutes

Electrolytes - liquids and solution that can conduct electricity

Electrolytic cells

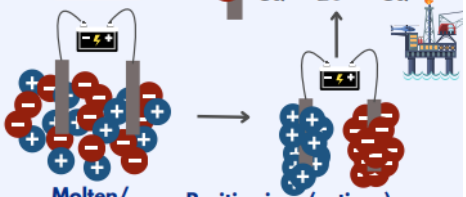
When an electric, 'electro', current is passed through an aqueous solution or molten ionic compound, the compound breakdowns, 'lysis'



OXIDATION - loss of electrons
$2Cl^- \rightarrow Cl_2 + 2e^-$ HT only

REDUCTION - gain of electrons
$Cu^{2+} + 2e^- \rightarrow Cu$ HT only

OILRIG



In a solid state, ionic compounds cannot conduct electricity due to a lack of free-moving ions - ions must be molten or dissolved in a solution to move. When the cell is activated, the electric current causes ions in the molton or solution to migrate towards the electrodes.

Solution	Positive electrode (anode)			Negative electrode (cathode)		
	Observations	Element formed	State	Observations	Element formed	State
Copper (II) chloride	Bubbles of pale-green gas Bleaches blue litmus white	Chlorine	gas	Brown/red solid coating on rod	Copper	solid
Sodium chloride	Bubbles of gas Bleaches blue litmus white	Chlorine	gas	Bubbles of gas (more rapid production)	Hydrogen	gas

A red litmus could detect the third main product of this electrolysis reaction

In solutions, H+ and positive ions are attracted to the cathode

Sodium is more reactive than hydrogen, thus hydrogen is produce at the cathode

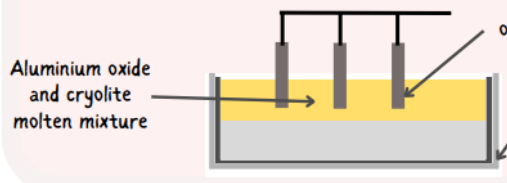
In solutions, OH- and negative ions are attracted to the anode

If the substance does not contain halide ions, oxygen is produced - in both of our reactions, chloride is the halide, therefore the halogen is produced at the anode.

Aluminium extraction

Aluminium is produced through the electrolysis of a molten mixture of aluminium oxide and cryolite, which has a lower melting point and better conductivity than pure aluminium oxide. This process is energy-intensive due to the high melting point of metals and the continuous electric current.

Carbon electrodes are used, but they react with oxygen to form carbon dioxide gas, leading to the loss of carbon and necessitating continual replacements, which increases costs.



O^{2-} formed at anode from oxidised O_2 ions reacts with carbon anode to form CO HT only
$2O^{2-} \rightarrow O_2 + 4e^-$

Al from reduced Al^{3+} ions
$Al^{3+} + 3e^- \rightarrow Al$ HT only

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Exam Style Questions - Electrolysis

1. Identify the names of the positive and negative electrodes? (2 marks)

2. Why is it important that the carbon electrodes do not touch each other during the experiment' (1 mark)

3. What observations would you expect at each electrode during the electrolysis of copper(II) chloride solution? (2 marks)

4. Complete the word equation for the electrolysis of copper(II) chloride solution:

Copper(II) chloride → _____ + _____ (2 marks)

5. A student carries out the electrolysis of sodium chloride solution.
a) What gas is produced at the negative electrode? (1 mark)
b) Why is this gas produced instead of sodium? (2 marks)

6. Explain how the ions move in an electrolyte during electrolysis. (3 marks)

7. Explain what happens to copper ions (Cu^{2+}) at the negative electrode during electrolysis. (3 marks)

8. A student electrolyses two different solutions: copper(II) chloride and sodium chloride. Compare the products at each electrode for both experiments. (4 marks)

9. Suggest one reason why the electrolysis of molten aluminium oxide is more expensive than electrolysis of copper(II) chloride solution. (1 mark)

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Learning Objectives -

- Investigate the variables that affect temperature change in chemical reactions e.g. acid + alkali
- Measure the temperature changes during the reaction
- Plot a graph of your results and record the temperature change

This method is for acid + alkali, but you could also investigate acid + metal, acid + metal carbonates or deplacement reactions.

Equipment & Apparatus


Dilute hydrochloric acid


Dilute sodium hydroxide solution


Thermometer


250cm beaker


10cm and 50cm measuring cylinder


Expanded polystyrene cup and lid with a hole to fit the thermometer

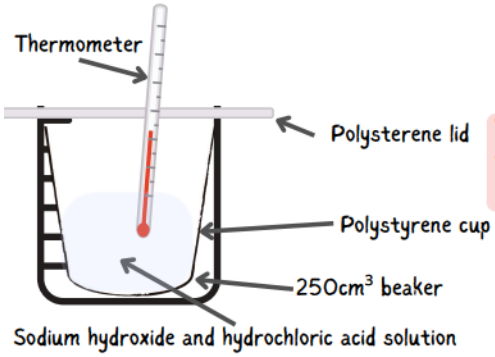
Independent variable - volume of NaOH added (cm^3)
Dependent variable - maximum temperature (°C)
Control variables - volume of HCl

Method:

1) Measure 30cm^3 dilute hydrochloric acid and pour into the polysterene cup.
2) Stand the cup inside the beaker. — This makes the set up more stable.
3) Insert the thermeter and record the temperature of the acid. Record results on a pre-prepared table.
4) Measure 5cm^3 sodium hydroxide solution.
5) Pour the sodium hydroxide solution into the polysterene cup and immediately fit the lid and stir with the thermometer through the hole.
5) Record the highest temperature reached on the thermometer on the 5cm^3 row.
6) Repeat steps 4-7 but with an additional 5cm sodium hydroxide solution each time, up to 40cm.
7) Wash all equipment and carry out a second trial at each volume, including 0cm.

Total volume of sodium hydroxide added (cm^3)	Maximum Temperature in °C		
	First trial	Second trial	Mean
0	20.0	21.0	20.5
5	24	24.8	24.4
10	27.2	26.6	26.9
...			
40	30.7	30.9	30.8

REQUIRED PRACTICAL 3 TEMPERATURE CHANGES

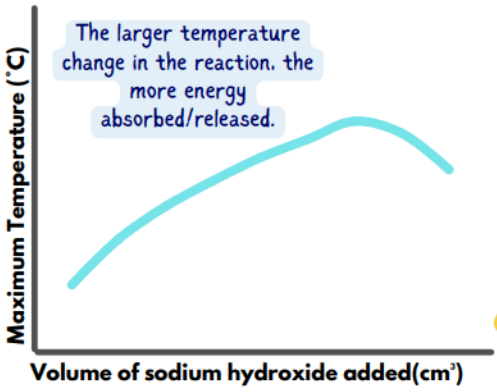


$$NaOH_{(aq)} + HCl_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$$

This neutralisation reaction is an exothermic reaction - it transfers heat into the surroundings so temperature increases
Endothermic reactions absorb energy from the surroundings.

Random Errors

- Unwanted heat transfer - the lid and beaker reduce this, but some heat will always be lost.
- Polystyrene is a poor conductor of heat, so most of the heat energy i absorbed by the reaction



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Exam Style Questions - Temperature Changes

1. What two solutions are mixed together in this practical? (2 marks)

2. What is the independent variable in this investigation? (1 mark)

3. What piece of equipment is used to measure the maximum temperature during the reaction? (1 mark)

4. Explain why a polystyrene cup is used instead of a glass beaker. (2 marks)

5. This reaction is exothermic.
a) What happens to the temperature during an exothermic reaction?
b) Why does this happen? (2 marks)

6. Describe how you would make the temperature change results more reliable. (2 marks)

7. The student notices the highest temperature recorded was lower than expected. Give one possible reason why. (1 mark)

8. A student plots a graph of volume of sodium hydroxide (x-axis) against maximum temperature (y-axis).
a) What shape would the graph likely show?
b) What does the peak of the graph represent in the reaction? (2 marks)

c. The graph shows temperature increasing with sodium hydroxide volume up to a point, then decreasing. Explain why this pattern occurs. (3 marks)

Section 2: Exam Question Practice

Recommended Video: GCSE Chemistry - Allotropes of Carbon - Diamond and Graphite

Explain why graphite conducts electricity.

Answer in terms of the structure and bonding in graphite.

(3)

Describe the structure and bonding of diamond.

[3 marks]

Explain why diamond has a very high melting point.

[3 marks]

Recommended Videos: Making Salts - GCSE Science Required PracticalGCSE Chemistry - Neutralisation Reactions

This question is about zinc and compounds of zinc.

A student produces pure crystals of zinc chloride by reacting zinc oxide with hydrochloric acid.

The equation for the reaction is:

$$ZnO(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2O(l)$$

The student adds zinc oxide to hydrochloric acid until the zinc oxide is in excess.

Give **one** observation that the student could make to show that the zinc oxide is in excess.

[1 mark]

Why is excess zinc oxide used rather than excess hydrochloric acid?

[1 mark]

Name **one other** compound that the student could add to hydrochloric acid to produce zinc chloride.

[1 mark]

Recommended video: GCSE Chemistry - Reactivity Series of Metals & Displacement Reactions

A student is given three metals, **X**, **Y** and **Z** to identify.

The metals are magnesium, iron and copper.

Plan an investigation to identify the three metals by comparing their reactions with dilute hydrochloric acid.

Your plan should give valid results.

[4 marks]

Recommended Video: GCSE Chemistry Revision "Electrolysis of Aqueous Solutions 1" - YouTube

Q1.

During electrolysis ions are discharged at the electrodes to produce elements.

A student investigates the electrolysis of sodium chloride.

(a) Why does solid sodium chloride **not** conduct electricity?

_____

_____

(1)

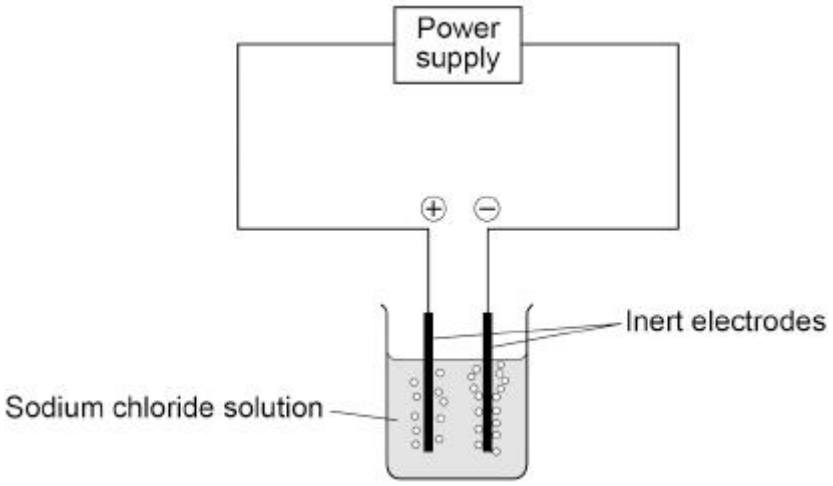
(b) Sodium chloride solution conducts electricity.

Complete the sentence.

Sodium chloride **also** conducts electricity when _____.

(1)

The figure below shows the apparatus for the electrolysis of sodium chloride solution.



(c) Suggest an element that could be used to make the inert electrodes.

_____

(1)

(d) Complete the half equation for the production of chlorine (Cl_2) at the positive electrode.

_____ Cl^- → _____ + _____

(2)

(e) Sodium chloride solution has a pH of 7

During the electrolysis of sodium chloride solution:

- hydrogen gas is produced at the negative electrode
- the pH of the solution increases.

Explain why.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

Section 3: Numeracy and Working Scientifically Skills Quiz on Educake

This quiz is on your Educake dashboard but you can also access it using the link below:

https://my.educake.co.uk/assessment/37487429

It is due by **6th September 2026**.