

YEAR 12 – BRIDGING UNITS

A-LEVEL CHEMISTRY



ST HILDA'S
COLLEGE

The 6th Form
@ St Hilda's

bridging
units

Name:

Anything is

POSSIBLE

A-level chemistry is one of the hardest subjects to study but is very rewarding and enjoyable. You need to be hardworking, organised, enthusiastic and resilient to succeed. Have you got what it takes?

In 2025 the average % for a grade 7 in Chemistry (Trilogy/Chemistry) was 55%. Which means you can still get confused. At A-level we need to assume that you are confident with the GCSE topics in this booklet as they will be the starting point for your A-level studies.



To succeed at A-level Chemistry you should study at least one subject from the following: Biology, Physics and Maths.

At the time of printing, your A-level teachers for 2026 – 2028 will be Dr Meredith and Mr Goodrum.

We are looking forward to seeing you in September.

Dr Meredith & Mr Goodrum

Contents & instructions

This work is to ensure you have a good understanding of certain topics as they are essential to success at A-level and are the starting point of a number of topics. Use the QR codes to access GCSE information pages from chemrevise.org and/or the Free Science Lessons videos.

If you do not know the answer to a question, please research the information and then answer the question to the best of your ability.

Deadline to hand in completed booklet: Friday 11th September 2026.

Any issues come and speak to us.

Section 1 - Quantitative Chemistry (50 marks)

Mark = / 50

Section 2 - Bonding (50 marks)

Mark = / 50

Total mark = / 100

Anything is

POSSIBLE

Section 1 Quantitative Chemistry

Use the QR codes to revise your knowledge of the GCSE quantitative/calculations topic.

Free science lessons videos

Balancing equations

<https://www.youtube.com/watch?v=vxCyzR6uETs>



Calculating moles

<https://www.youtube.com/watch?v=Md4BQL91U6w>



Calculating mass of a number of moles

<https://www.youtube.com/watch?v=kMak1TQ3YgU>



Avogadro's Constant 1

<https://www.youtube.com/watch?v=3y8YDINeuRk>



Reacting Masses 1

<https://www.youtube.com/watch?v=TV6n5MFH6IU>



Anything is

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Reacting Masses 2

<https://www.youtube.com/watch?v=5zOpoen0dV0>



Concentration of solutions

<https://www.youtube.com/watch?v=3G3KQIyoZDI>



Limiting reagents

<https://www.youtube.com/watch?v=MuzOmFhiE8o>



Atomic structure and the Periodic Table

<https://www.freesciencelessons.co.uk/gcse-chemistry-paper-1/atomic-structure-and-the-periodic-table/>



Atomic Structure and the periodic table chemrevise.org

<https://chemrevise.org/wp-content/uploads/2025/10/4.1-atomic-structure-and-periodic-table.pdf>



Quantitative / calculations chemrevise.org

<https://chemrevise.org/wp-content/uploads/2024/02/4.3-quantitative-chemistry.pdf>



Anything is

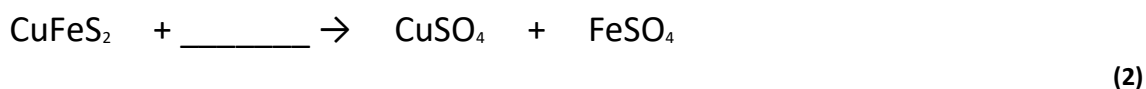
POSSIBLE

Section 1 Quantitative Questions

Balancing equations

Q1. Copper is extracted from metal ores. Chalcopyrite is a metal ore containing a compound with the formula CuFeS_2

(a) CuFeS_2 reacts with oxygen to produce copper(II) sulfate and iron(II) sulfate. Complete the equation for this reaction. You should balance the equation.

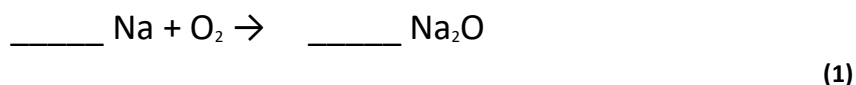


Q2.

Sodium is in Group 1 of the periodic table.

Sodium reacts with oxygen to produce sodium oxide.

(a) Balance the equation for the reaction.

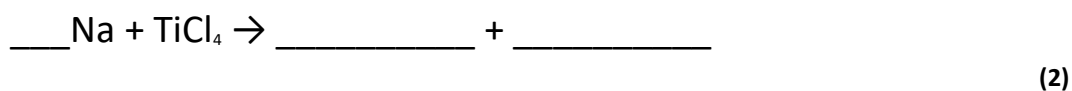


Q3.

Sodium reacts with titanium chloride (TiCl_4) to produce titanium.

(b) Complete the equation.

You should balance the equation.



(c) The reaction between sodium and titanium chloride is a redox reaction.

Write a half-equation to show that sodium is oxidised in this reaction.

_____ (2)

Anything is

POSSIBLE

Concentration

Q4. This question is making up concentrations of solutions.

a) Citric acid ($\text{C}_6\text{H}_8\text{O}_7$) is a solid. A student investigated the temperature change during the reaction between citric acid and sodium hydrogencarbonate solution.

The student made 250 cm^3 of a solution of citric acid of concentration 0.0500 mol/dm^3

Calculate the mass of citric acid ($\text{C}_6\text{H}_8\text{O}_7$) required.

Relative atomic masses (A_r): $\text{H} = 1$ $\text{C} = 12$ $\text{O} = 16$

Mass = _____ g

(3)

b) A chemist was asked to produce a 500 cm^3 solution of barium chloride (BaCl_2) of a concentration of 0.4 mol/dm^3 . Calculate the mass of barium chloride needed to make this solution.

Mass = _____ g

(3)

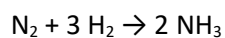
(Total 6 marks)

Anything is

POSSIBLE

Q5. Reacting masses

The equation for the reaction between nitrogen and hydrogen to produce ammonia is:



Calculate the mass of hydrogen that is needed to produce 25 g of ammonia.

Relative atomic masses (A_r): $\text{H} = 1$ $\text{N} = 14$

Mass of hydrogen = _____ g

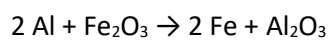
(4)

Anything is

POSSIBLE

Limiting reagents

Q7. This question is about displacement reactions. A mixture contains 1.00 kg of aluminium and 3.00 kg of iron oxide. The equation for the reaction is:



Show that aluminium is the limiting reactant.

Relative atomic masses (A_r): O = 16 Al = 27 Fe = 56

(4) (Total 4 marks)

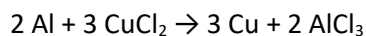
Anything is

POSSIBLE

Q8.

108 g of aluminum reacts with 1.21 kg of copper chloride to produce copper.

The equation for the reaction is:



Calculate the maximum mass of copper produced in grams (g).

You should determine the limiting reactant.

Relative atomic masses (A_r): Al = 27 Cu = 63.5

Relative formula masses (M_r): $\text{CuCl}_2 = 134.5$ $\text{AlCl}_3 = 133.5$

This image shows a single page of white paper with ten evenly spaced horizontal blue lines. The lines run across the width of the page, leaving small margins at the top and bottom. There are no vertical margin lines or other markings present.

Limiting reactant is _____

Mass of copper = _____ g

(6)

(Total 6 marks)

Anything is

POSSIBLE

Atomic Structure & Avogadro's constant

Q9. This question is about subatomic particles.

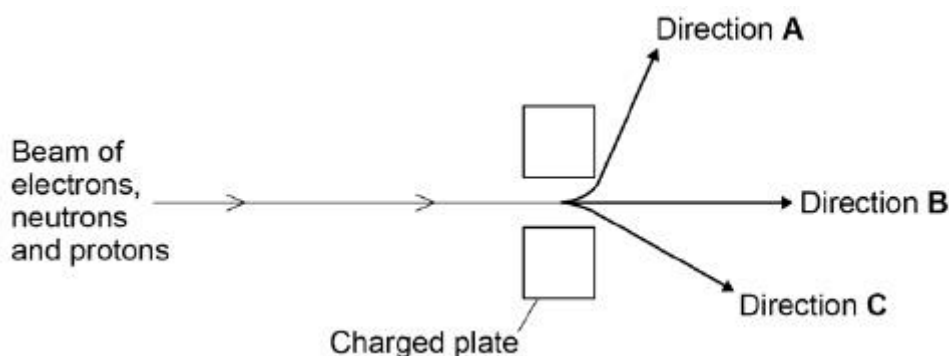
(a) Subatomic particles in an atom are electrons, protons and neutrons. Complete the table to show when each subatomic particle was discovered.

Date of discovery	Subatomic particle
1897	
1920	
1932	

(2)

(b) A beam of electrons, neutrons and protons travelling at the same speed is passed through two oppositely charged plates.

The diagram shows the directions of three particles after passing through the charged plates.



The charges on the electric plates are **not** shown. The heavier the particle the less the deflection. Explain which directions the electrons, neutrons and protons will take.

Anything is POSSIBLE (4)

(c) Calculate the mass of one atom of sodium.

Avogadro constant = 6.02×10^{23} per mole.

Give your answer to 3 significant figures.

Mass of one atom of sodium = _____ g

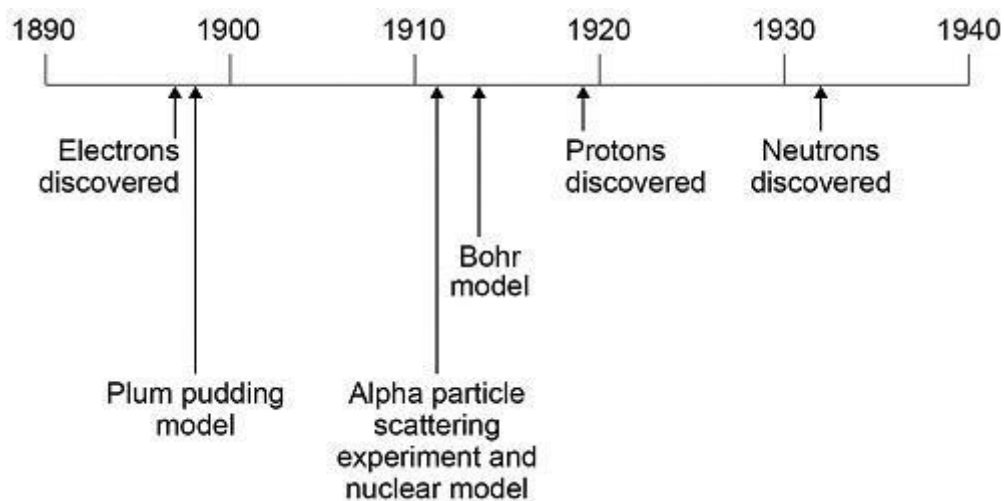
(2)

(Total 8 marks)

Atomic Structure

Q10. This question is about the development of scientific theories.

The diagram below shows a timeline of some important steps in the development of the model of the atom.



Anything is

POSSIBLE

(a) The plum pudding model did not have a nucleus.

Describe **three** other differences between the nuclear model of the atom and the plum pudding model.

1 _____

2 _____

3 _____

(3)

(b) Niels Bohr adapted the nuclear model.

Describe the change that Bohr made to the nuclear model.

(2)

(c) Chadwick's experiments showed the existence of neutrons in an atom.

This led to an understanding of isotopes.

Define the term 'isotopes'.

Refer to subatomic particles in your answer.

Anything is

POSSIBLE (2)
(Total 7 marks)

Q11. Chlorine has two isotopes.

Table 2 shows the percentage abundance of the two isotopes of chlorine.

Table 2

Isotope	Percentage (%) abundance
$^{35}_{17}\text{Cl}$	75.77
$^{37}_{17}\text{Cl}$	24.23

Calculate the relative atomic mass (A_r) of chlorine.

Give your answer to 2 decimal places.

Relative atomic mass (2 decimal places) = _____

(3)

Quantitative Total = / 50

Anything is

POSSIBLE

Section 2 Bonding

Use the QR codes to revise your knowledge of the GCSE bonding topic.

A link to chemrevise.org

<https://chemrevise.org/wp-content/uploads/2023/10/4.2-bonding-and-structure.pdf>



Link of free science lessons

<https://www.freesciencelessons.co.uk/gcse-chemistry-paper-1/structure-and-bonding/>



Anything is

POSSIBLE

Ionic Bonding

Q1. Calcium reacts with chlorine to produce calcium chloride.

- a) Draw a calcium atom and calcium ion. (2)

- b) Draw a chlorine atom and chloride ion. (2)

- c) Explain what happens to calcium atoms and to chlorine atoms when calcium reacts with chlorine to produce calcium chloride. (5)

Anything is

Anything is

(Total 9 marks)

Q2. Explain why solid calcium chloride does not conduct electricity. **(2)**

a) Explain why molten and a solution of calcium chloride do conduct electricity. **(2)**

b) Explain why calcium chloride has a high melting point. **(3)**

(Total 7 marks)

Q3. Write the formula for the following ionic compounds:

e.g. Sodium oxide = $\text{Na}^+ \text{O}^{2-}$ = Na_2O

- a) Calcium fluoride
- b) Iron(III) carbonate
- c) Ammonium sulfate
- d) Barium hydroxide

Anything is **(Total 4 marks)**

POSSIBLE

Simple covalent bonding

Q4.

a) Explain How and why are covalent bonds formed?

(2)

b) Complete dot and cross diagrams for the following molecules:

(4)

NH₃

Cl₂

O₂

N₂

Anything is

(Total 6 marks)

POSSIBLE

Q5. a) Why don't most covalent molecules conduct electricity?

(3)

(b) Explain why water (H_2O) has a low melting point.

(3)

(Total 6 marks)

Anything is

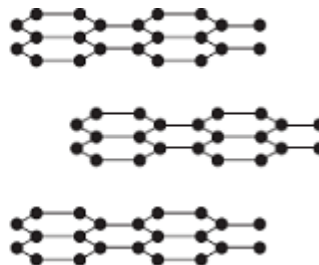
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Giant Covalent structures

Q6. The diagrams show the structures of diamond and graphite.



Diamond



Graphite

Use the diagrams above and your knowledge of structure and bonding to explain why:

(i) graphite is very soft

(2)

(iii) graphite conducts electricity.

(2)

(ii) diamond is very hard

(2)

Anything is

(Total 6 marks)

POSSIBLE

Metallic bonding

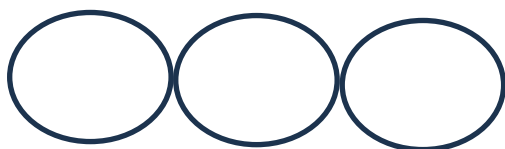
Q7. a) Draw the atom and ion for the following metals:

Na

Al

(4)

b) In a cube of magnesium metal explain how the metallic bonds are formed, include a diagram showing 9 atoms/ions. The first 3 have been drawn for you.



(5)

Anything is

POSSIBLE

(d) Explain why the structure of copper allows the conduction of electricity.

(3)

(Total 12 marks)

Bonding total = / 50

Anything is

POSSIBLE

