AQA GCSE CHEMISTRY (HIGHER) · 8462

CHEMISTRY



EXAM QUESTION PACK

4.3.1 CHEMICAL MEASUREMENTS, CONSERVATION OF MASS AND QUANTITATIVE INTERPRETATION OF EQUATIONS (PACK 3)

SCORE	PERCENTAGE
/190	%

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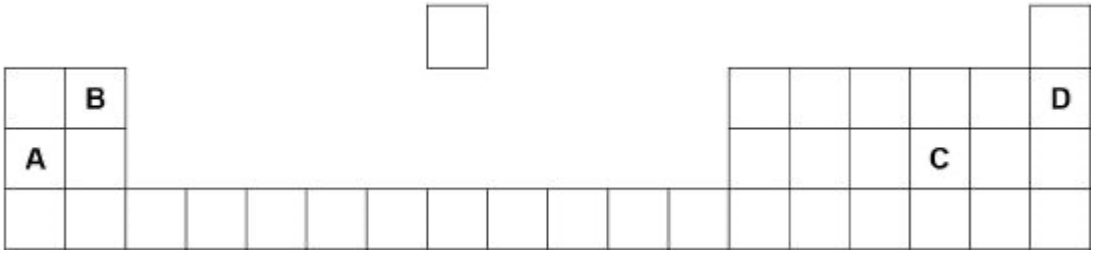
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Q1.

This question is about the elements in Group 2 of the periodic table.

(a) **Figure 1** shows the positions of four elements, **A**, **B**, **C**, and **D**, in the periodic table.

Figure 1



Which element is in Group 2?

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

Group 2 metal carbonates break down when heated to produce a metal oxide and a gas.

metal carbonate ⟶ metal oxide + gas

(b) Name the two products when calcium carbonate ($CaCO_3$) is heated.

_____ and _____

(2)

(c) What type of reaction happens when a compound breaks down?

Tick **one** box.

burning ☐

decomposition ☐

neutralisation ☐

reduction ☐

(1)

(d) The metal carbonate takes in energy from the surroundings to break down.

What type of reaction takes in energy from the surroundings?

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Tick **one** box.

combustion ☐

electrolysis ☐

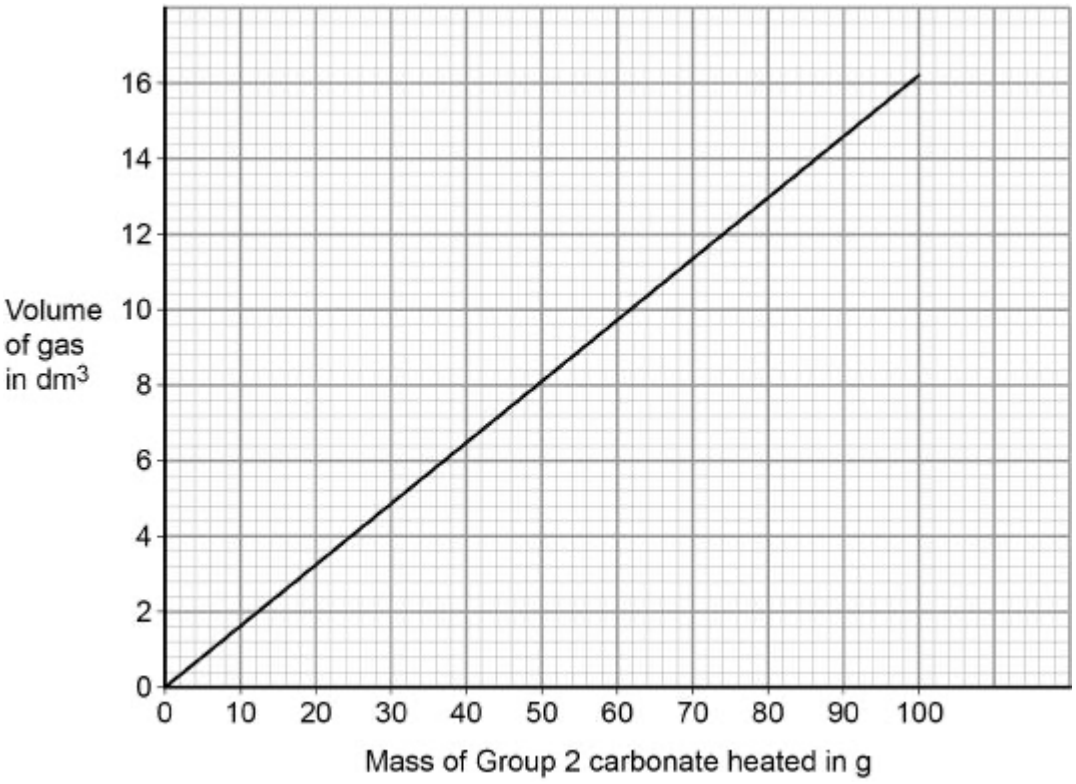
endothermic ☐

exothermic ☐

(1)

(e) **Figure 2** shows the volume of gas produced when a Group 2 metal carbonate is heated.

Figure 2



The student collected 5.2 dm^3 of gas.

What mass of the Group 2 metal carbonate is heated?

Mass = _____ g

(1)

(f) Calculate the mass of the Group 2 carbonate needed to produce 24 dm^3 of gas.

Use your answer from part **(e)** to help you.

_____

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Mass = _____ g

(2)

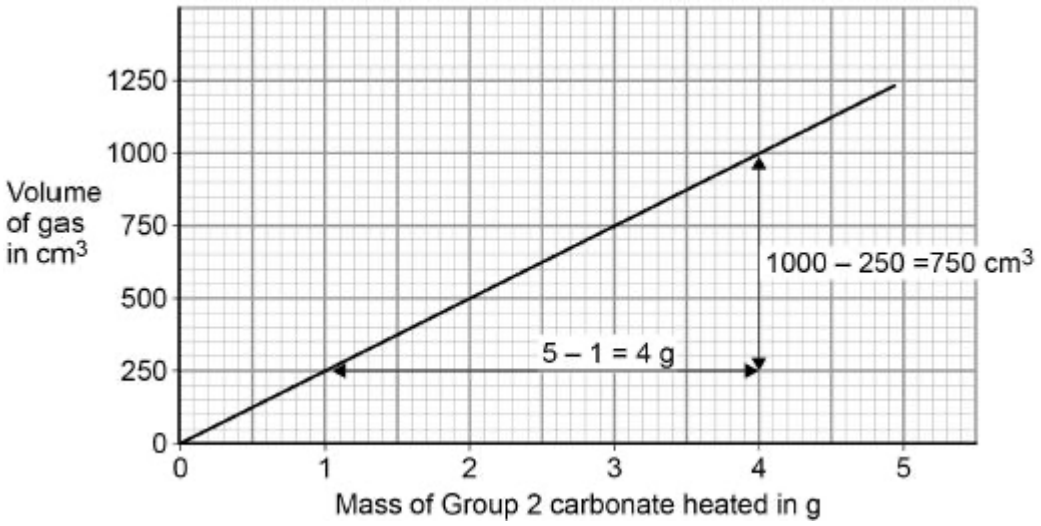
(g) A student heated different masses of a Group 2 carbonate. The student measured the volume of gas produced.

Figure 3 shows a graph of the student's results.

The student calculates the gradient of the line in **Figure 3**

The student makes **two** mistakes.

Figure 3



$$\text{Correct formula for gradient} = \frac{\text{Increase in volume of gas}}{\text{Increase in mass of Group 2 metal carbonate heated}}$$

$$\text{Student's calculation} = \frac{4}{750} = 0.00533 \text{ cm}^3 \text{ per g}$$

Identify the **two** mistakes the student makes.

Calculate the correct gradient of the line.

Mistake 1 _____

_____

Mistake 2 _____

_____

Calculation _____

_____

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Gradient = _____ cm^3 per g

(4)

(h) A student repeated the experiment with a different Group 2 metal carbonate (**X**CO_3).

The relative formula mass (M_r) of **X**CO_3 is 84

Relative atomic masses (A_r): C = 12 O = 16

Calculate the relative atomic mass (A_r) of **X**.

Name metal **X**.

Use the periodic table.

_____

_____

_____

_____

Relative atomic mass (A_r) = _____

Metal **X** is _____

(4)

(Total 16 marks)

Q2.

Group 2 metal carbonates thermally decompose to produce a metal oxide and a gas.

(a) Give the formula of each product when calcium carbonate ($CaCO_3$) is heated.

_____ and _____

(2)

(b) The relative formula mass (M_r) of a Group 2 metal carbonate is 197

Relative atomic masses (A_r): C = 12 O = 16

Calculate the relative atomic mass (A_r) of the Group 2 metal in the metal carbonate.

Name the Group 2 metal.

_____

_____

_____

_____

_____

_____

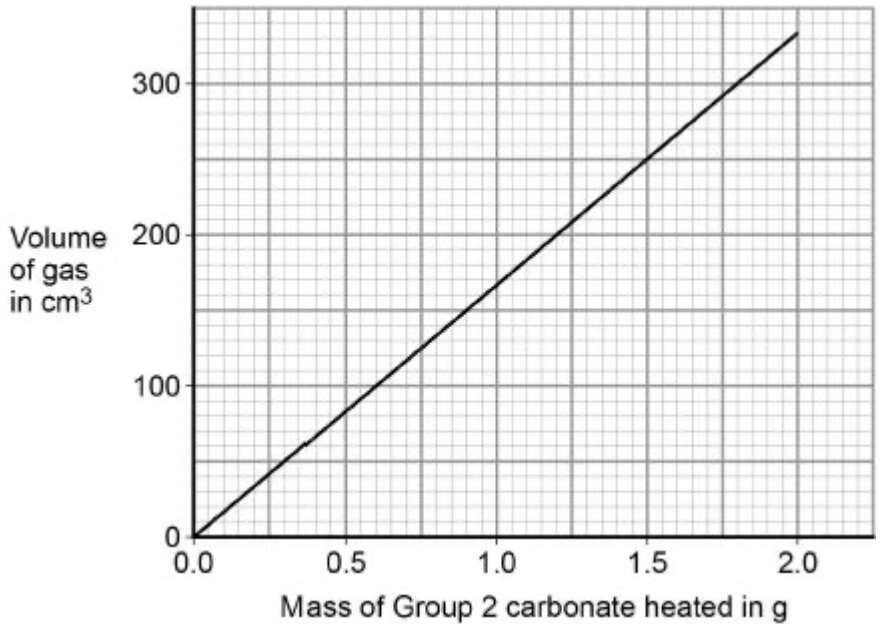
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Relative atomic mass (A_r) = _____

Metal _____

(3)

The graph below shows the volume of gas produced when a different Group 2 carbonate, **W**, is heated.



(c) Calculate the gradient of the line in the graph above.

Give the unit.

_____

_____

_____

_____

_____

_____

_____

_____

Gradient _____

Unit _____

(3)

(d) 24 dm^3 of gas is produced when one mole of a Group 2 carbonate is heated.

Determine the relative formula mass of the Group 2 carbonate **W**.

Use the graph above.

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Relative formula mass (M_r) = _____

(4)

(Total 12 marks)

Q3.

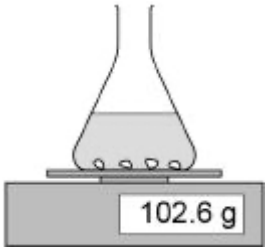
A student investigated the effect of the size of marble chips on the rate of the reaction between marble chips and hydrochloric acid.

This is the method used.

1. Add 10.0 g of marble chips into the flask.
2. Add 50 cm^3 of hydrochloric acid and start a timer.
3. Record the mass lost from the flask every 10 seconds.
4. Repeat steps 1 to 3 with different sizes of marble chips.

Figure 1 shows the apparatus.

Figure 1



(a) Draw **one** line from each type of variable to the correct example of the variable.

Type of variable	**Example of variable**

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	Mass lost from flask
Independent	Size of flask
	Size of marble chips
Control	Time taken
	Volume of acid

(2)

(b) The equation for the reaction is:

$$CaCO_3(s) + 2HCl(aq) \; CaCl_2(aq) + H_2O(l) + CO_2(g)$$

Name the **three** products.

1. _____

2. _____

3. _____

(2)

(c) Another student suggests putting some cotton wool in the top of the flask.

Suggest why this improves the investigation.

_____

_____

(1)

(d) The reaction produces 1.6 g of gas in 30 seconds.

Calculate the mean rate of the reaction in the first 30 seconds.

Use the equation:

$$\text{mean rate of reaction} = \frac{\text{mass of product produced in grams}}{\text{time in seconds}}$$

_____

_____

Mean rate of reaction = _____

(1)

(e) What is the unit for the mean rate of reaction calculated in part **(d)**?

Tick **one** box.

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g ☐ g/s ☐ s ☐ s/g ☐

(1)

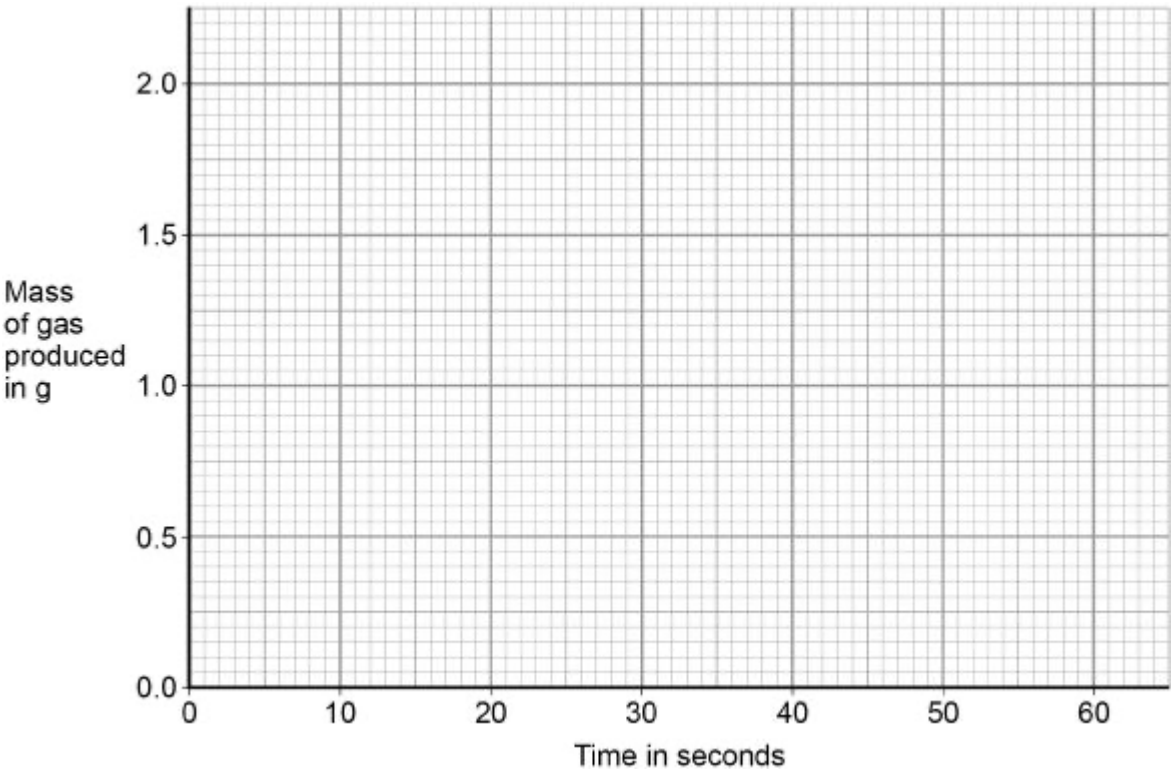
(f) The table below shows the student's results.

Time in seconds	Mass of gas produced in g
0	0.0
10	0.8
20	0.6
30	1.6
40	1.8
50	2.0
60	2.0

Plot the data from the table above on **Figure 2**

Draw a line of best fit.

Figure 2

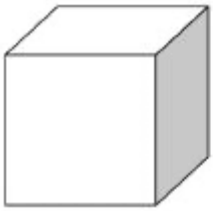


(3)

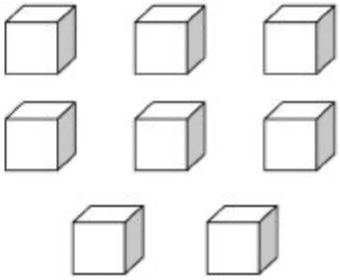
(g) **Figure 3** shows a large marble chip and eight small marble chips.

Figure 3

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Large marble chip



Eight small marble chips

The large marble chip has the same total volume as the eight small marble chips, but a different surface area.

Why do the eight small marble chips react faster than the large marble chip?

Tick **one** box.

The eight small marble chips have a larger surface area, so less frequent collisions.	☐
The eight small marble chips have a larger surface area, so more frequent collisions.	☐
The eight small marble chips have a smaller surface area, so less frequent collisions.	☐
The eight small marble chips have a smaller surface area, so more frequent collisions.	☐

(1)

(Total 11 marks)

Q4.

Fertilisers are formulations.

(a) What is a formulation?

_____

_____

(1)

(b) A bag of fertiliser contains 14.52 kg of ammonium nitrate (NH_4NO_3).

Relative formula mass (M_r): NH_4NO_3 = 80

Calculate the number of moles of ammonium nitrate in the bag of fertiliser.

Give your answer in standard form to 2 significant figures.

_____

_____

_____

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Moles of ammonium nitrate = _____ mol

(4)

(c) The fertiliser also contains potassium chloride.

Explain why potassium chloride has a high melting point.

(4)

(Total 9 marks)

Q5.

A teacher extracted copper from copper oxide.

This is the method used.

1. Mix 1.30 g of zinc and 1.59 g of copper oxide.
2. Heat the mixture strongly.
3. When the mixture starts to glow, stop heating.
4. Let the glow spread through the mixture.
5. Leave the mixture to cool.

(a) This reaction is exothermic.

Which part of the method shows the reaction is exothermic?

Tick **one** box.

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Mix zinc and copper oxide ☐

Heat the mixture ☐

Let the glow spread ☐

Leave to cool ☐

(1)

The equation for the reaction between zinc and copper oxide is:

$$\underset{1.30\ g}{Zn(s)} + \underset{1.59\ g}{CuO(s)} \rightarrow \underset{1.62\ g}{ZnO(s)} + Cu(s)$$

(b) 1.30 g of zinc fully reacted with 1.59 g of copper oxide to produce 1.62 g of zinc oxide.

What mass of copper was produced?

_____

_____

Mass of copper produced = _____ g

(1)

(c) What is the physical state of zinc oxide in the reaction?

Tick **one** box.

Aqueous ☐

Gas ☐

Liquid ☐

Solid ☐

(1)

(d) Which substance has been oxidised in the reaction?

Tick **one** box.

Copper ☐

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Copper oxide ☐

Zinc ☐

Zinc oxide ☐

(1)

(e) What type of reaction takes place when zinc reacts with copper oxide?

Tick **one** box.

Combustion ☐

Crystallisation ☐

Displacement ☐

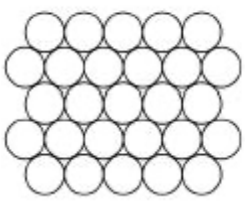
Neutralisation oxide ☐

(1)

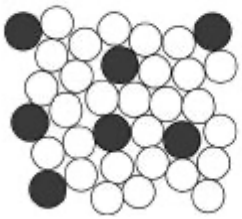
Copper is a metal.

(f) Which structure represents the arrangement of atoms in pure copper?

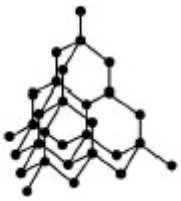
A



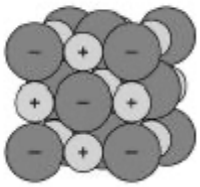
B



C



D



Tick **one** box.

A ☐

B ☐

C ☐

D ☐

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(1)

(g) Copper is used in electrical wiring.

Give **one** reason why.

_____

_____

(1)

(h) In the UK, 40% of the copper we use is recycled copper.

The other 60% is copper obtained by mining.

What is the simplest ratio of recycled copper to copper obtained by mining?

Tick **one** box.

2 : 3 ☐

2 : 5 ☐

4 : 10 ☐

6 : 4 ☐

(1)

(i) What are **two** advantages of recycling copper?

Tick **two** boxes.

Conserves copper ores ☐

Increase in greenhouse gases ☐

Less energy used ☐

More jobs for miners ☐

More space used at landfill ☐

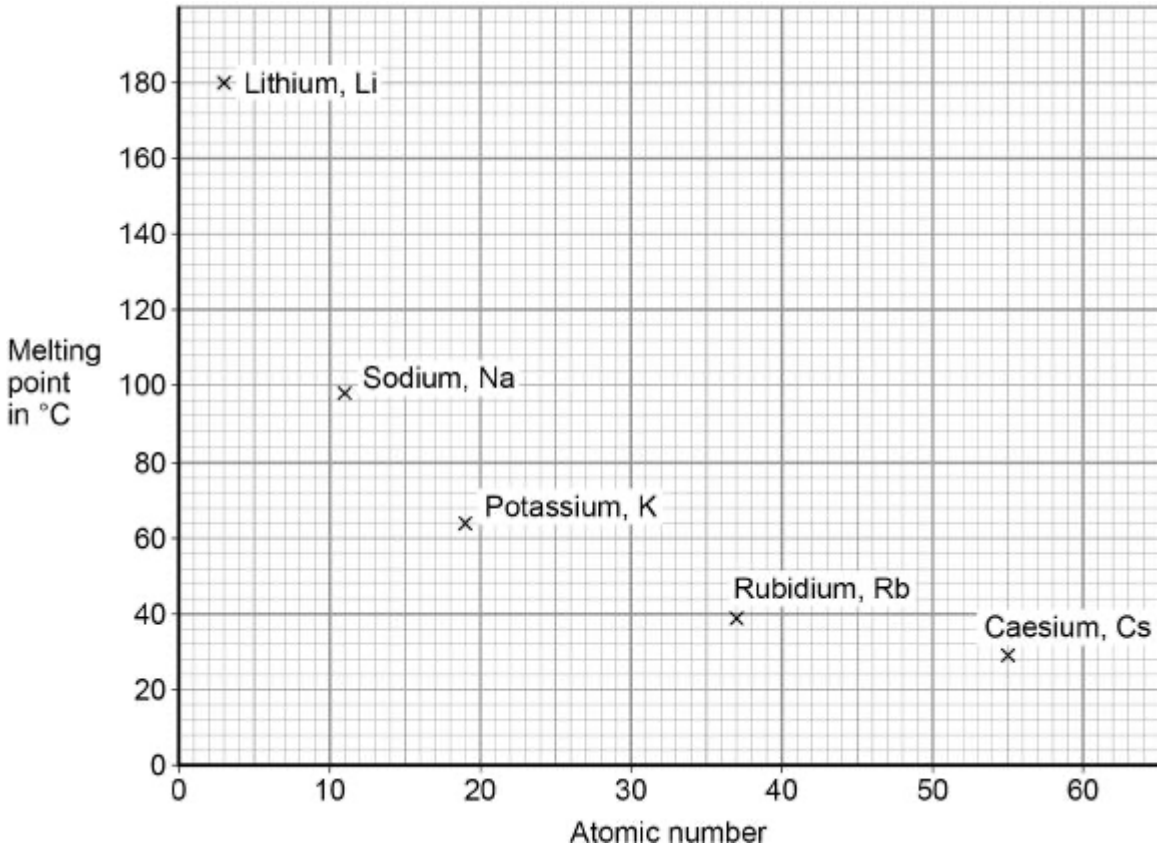
(2)
(Total 10 marks)

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Q6.

This question is about Group 1 metals.

The graph below shows the melting points of Group 1 metals plotted against their atomic number.



(a) Describe the trend shown by the melting points of Group 1 metals as the atomic number increases.

_____

_____

(1)

(b) Determine the atomic number and melting point of caesium.

Use the graph above.

Atomic number of caesium = _____

Melting point of caesium = _____ °C

(1)

Lithium is a Group 1 metal.

(c) A lithium atom can be shown as $^{7}_{3}Li$

How many electrons does the **outer shell** of a lithium atom contain?

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Tick **one** box.

1 ☐

3 ☐

4 ☐

7 ☐

(1)

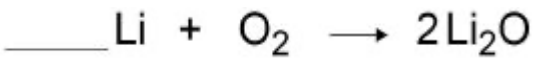
(d) Lithium reacts with oxygen to produce lithium oxide.

Draw **one** line from each substance to the correct description of the substance.

Substance	Description
	compound
Lithium oxide	element
	metal
Oxygen	mixture
	polymer

(2)

(e) Balance the equation for the reaction of lithium with oxygen.



(1)

(f) What type of bonding is present in lithium oxide?

Tick **one** box.

Covalent ☐

Ionic ☐

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Metallic ☐

(1)

(g) Calculate the relative formula mass (M_r) of lithium oxide (Li_2O).

Relative atomic masses (A_r): Li = 7 O = 16

_____

_____

_____

Relative formula mass = _____

(2)

(Total 9 marks)

Q7.

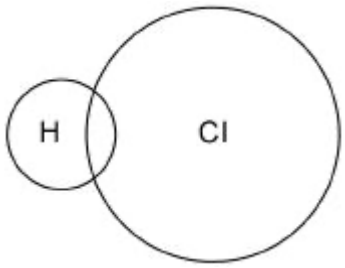
This question is about hydrogen chloride.

(a) A hydrogen atom contains 1 electron and a chlorine atom contains 17 electrons.

Complete **Figure 1** to show a dot and cross diagram for a hydrogen chloride molecule.

Show the outer electrons only.

Figure 1



(2)

Hydrogen gas (H_2) reacts with chlorine gas to produce hydrogen chloride.

(b) Complete the balanced chemical equation for the reaction between hydrogen and chlorine.

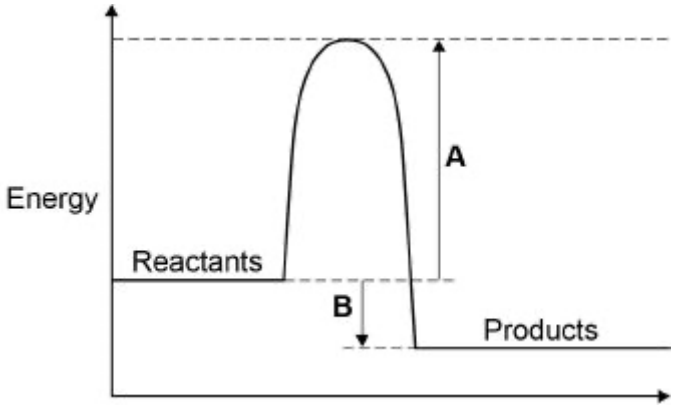
$$H_2 + \text{_____} \rightarrow \text{_____}$$

(2)

Figure 2 shows the reaction profile diagram for the reaction between hydrogen and chlorine.

Figure 2

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(c) What do **A** and **B** represent on **Figure 2**?

A _____

B _____

(2)

(d) How does the reaction profile diagram show that the reaction is exothermic?

_____

_____

(1)

(e) Hydrogen chloride gas dissolves in water to form hydrochloric acid.

Hydrochloric acid contains hydrogen ions and chloride ions.

Explain why hydrogen chloride gas does not conduct electricity but hydrochloric acid is able to conduct electricity.

_____

_____

_____

_____

_____

_____

(3)

(Total 10 marks)

Q8.

A teacher demonstrated the extraction of copper from copper oxide.

This is the method used.

1. Mix 1.30 g of zinc and 1.59 g of copper oxide.
2. Heat the mixture strongly.

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3. When the mixture starts to glow, stop heating.
4. Let the glow spread through the mixture.
5. Leave the mixture to cool.
6. Add hydrochloric acid to the cooled mixture.
7. Filter the mixture obtained in step 6.

(a) A student concluded that an exothermic reaction had taken place.

Explain how an observation made during the demonstration shows this.

(2)

(b) The equation for the reaction between zinc and copper oxide is:

$$Zn + CuO \longrightarrow ZnO + Cu$$

1.59 g of copper oxide reacted.

Calculate the mass of copper produced.

Relative atomic masses (A_r): Cu = 63.5 O = 16 Zn = 65

Mass of copper produced = _____ g

(3)

(c) Explain why steps 6 and 7 result in only copper being obtained as the residue.

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(4)

(d) The ionic equation for the reaction is:

$$Zn + Cu^{2+} \longrightarrow Zn^{2+} + Cu$$

Which statement about the reaction between zinc and copper ions is correct?

Tick **one** box.

Copper ions have been oxidised because the copper ions have gained electrons.	☐
Copper ions have been oxidised because the copper ions have lost electrons.	☐
Zinc has been oxidised because the zinc atoms have gained electrons.	☐
Zinc has been oxidised because the zinc atoms have lost electrons.	☐

(1)

(Total 10 marks)

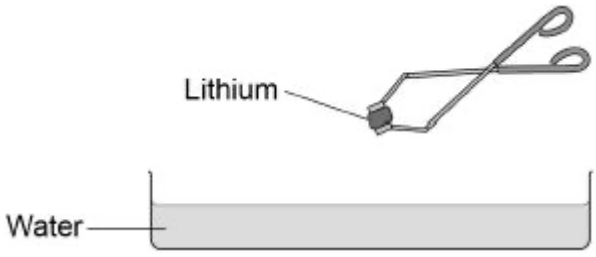
Q9.

This question is about Group 1 elements.

A teacher demonstrated the reaction of Group 1 elements with water.

Figure 1 shows the apparatus.

Figure 1



(a) What name is given to Group 1 elements?

Tick **one** box.

Alkali metals	☐
Halogens	☐
Noble gases	☐

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Non-metals ☐

(1)

(b) The teacher wore safety glasses and used tongs to handle the elements.

Suggest **one** other safety precaution the teacher should take.

_____

_____

(1)

Table 1 shows the teacher's results.

Table 1

Element	**Observations**
Lithium	• bubbles form • lithium moves slowly on surface
Sodium	• bubbles form • sodium moves quickly on surface • sodium melts to form a ball
Potassium	• bubbles form • potassium moves very quickly on surface • potassium melts to form a ball • a lilac flame is seen

(c) Describe the trend in reactivity in Group 1.

Give **two** observations from **Table 1** which provide evidence for the trend.

_____

_____

_____

_____

_____

_____

(3)

(d) Rubidium is a Group 1 element.

Rubidium is below potassium in the periodic table.

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Suggest why the teacher did **not** demonstrate the reaction between rubidium and water.

_____

_____

(1)

(e) Complete the balanced equation for the reaction between sodium and water.

_____ Na + _____ H_2O ⟶ _____ NaOH + H_2

(1)

(f) What is the name of the compound with the formula NaOH?

Tick **one** box.

Sodium dioxide ☐

Sodium hydrate ☐

Sodium hydroxide ☐

Sodium oxide ☐

(1)

Table 2 shows the diameter of atoms of Group 1 elements.

Element	**Diameter of atom in nanometres**
Lithium	0.304
Sodium	0.372
Potassium	**X**
Rubidium	0.496
Caesium	0.530

(g) Predict value **X** in **Table 2**.

X = _____ nanometres

(1)

(h) 1 nanometre is 10^{-9} metres.

What is the diameter of a lithium atom in metres?

Tick **one** box.

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3.04×10^{-8} m ☐

3.04×10^{-9} m ☐

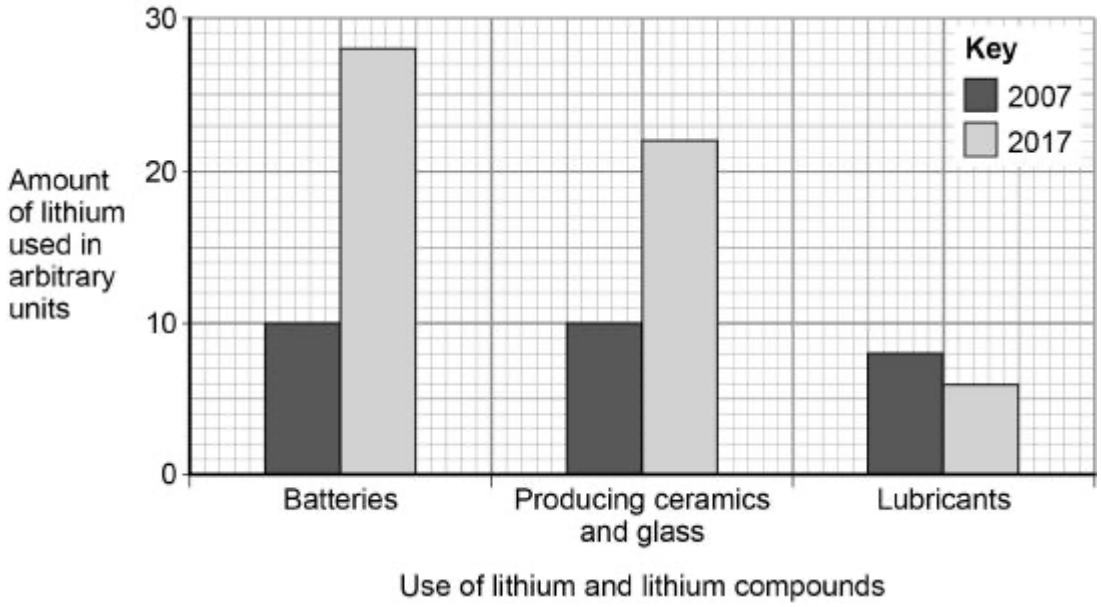
3.04×10^{-10} m ☐

3.04×10^{-11} m ☐

(1)

Figure 2 shows the use of lithium and lithium compounds in 2007 and 2017.

Figure 2



(i) Describe how the use of lithium and lithium compounds changed between 2007 and 2017.

You must include data from **Figure 2** in your answer.

_____

_____

_____

_____

_____

_____

(3)

(Total 13 marks)

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Q10.

Two students investigated the electrolysis of copper sulfate solution.

When copper sulfate solution is electrolysed, copper is produced at the negative electrode.

(a) What substance is produced at the positive electrode when copper sulfate solution is electrolysed?

Tick **one** box.

Hydrogen ☐

Oxygen ☐

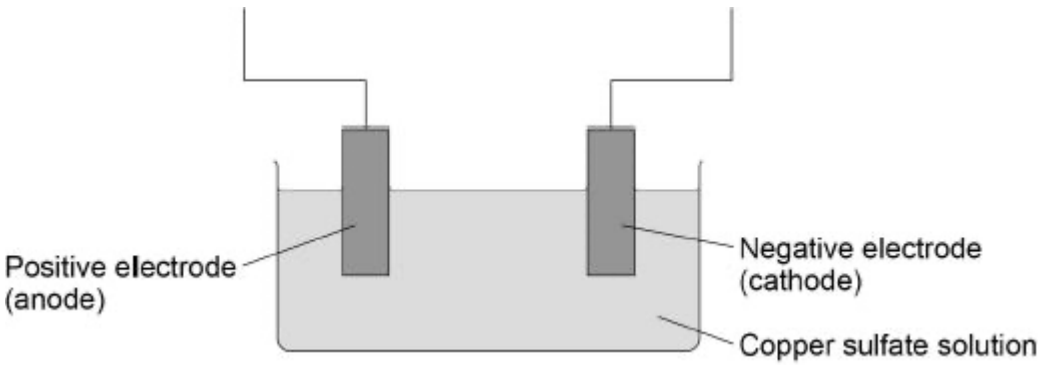
Sulfur ☐

Sulfur dioxide ☐

(1)

(b) The students varied and measured the current in the circuit.

Complete the diagram below to show a circuit that could be used.



(3)

The students made the following hypothesis:

'The mass of copper deposited on the negative electrode will be directly proportional to the current.'

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The table below shows the students' results.

Current in amps	Mass of copper deposited on the negative electrode in grams
0.12	0.024
0.24	0.047
0.36	0.057
0.48	0.095
0.60	0.118
0.72	0.142

(c) Student **A** said that the results did support the hypothesis.

Student **B** said that the results did **not** support the hypothesis.

Explain the extent to which the data in the table above supports the students' hypothesis.

(4)

(d) Calculate the number of moles of copper deposited on the negative electrode when the current is 0.72 A

Give your answer in standard form.

Use the table above.

Relative atomic mass (A_r) of copper = 63.5

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Number of moles = _____

(2)

(e) What change to the investigation would increase the mass of copper deposited on the negative electrode?

Tick **one** box.

Decrease the concentration of copper sulfate solution ☐

Decrease the volume of copper sulfate solution ☐

Increase the distance between the electrodes ☐

Increase the time the circuit is switched on for ☐

(1)

(Total 11 marks)

Q11.

This question is about compounds of oxygen.

The reaction between carbon and oxygen is exothermic.

(a) What does exothermic reaction mean?

_____

_____

(1)

(b) Which is the correct reaction profile (energy level diagram) for an exothermic reaction?

Tick **one** box.

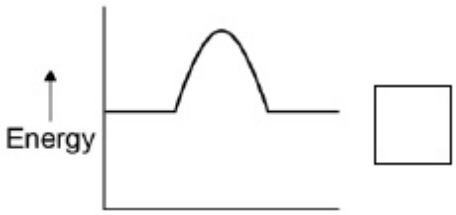


☐



☐

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(1)

(c) The percentage by mass of oxygen in carbon dioxide (CO_2) is calculated by the equation:

$$\text{percentage by mass} = \frac{\text{number of atoms of O} \times \text{Relative atomic mass of oxygen (O)}}{\text{relative molecular mass of carbon dioxide } (CO_2)} \times 100$$

Relative atomic masses (A_r): C = 12 O = 16

Calculate the percentage by mass of oxygen in carbon dioxide (CO_2).

Percentage by mass of oxygen = _____ %

(3)

Hydrogen peroxide decomposes to produce water and oxygen.

(d) Balance the chemical equation.

$$____ H_2O_2 \rightarrow ____ H_2O + O_2$$

(1)

(e) 6.8 g of hydrogen peroxide decomposes to produce 3.6 g of water.

Calculate the mass of oxygen produced when 68 g of hydrogen peroxide decomposes.

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Mass of oxygen = _____ g

(2)

(Total 8 marks)

Q12.

(a) Methane is burned in a plentiful supply of oxygen.

Which is the correct balanced chemical equation?

Tick **one** box.

$CH_4 + O_2 \rightarrow CO_2 + H_2O$ ☐

$CH_4 + 2O_2 \rightarrow CO_2 + H_2O$ ☐

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ ☐

$CH_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$ ☐

(1)

(b) Burning fuels causes atmospheric pollution.

Write **one** effect for each pollutant in **Table 1**.

Table 1

Pollutant	Effect
Carbon monoxide	
Sulfur dioxide	
Particulates	

(3)

(c) Methane, petrol and coal are fuels.

Table 2 shows information about these fuels.

Table 2

Fuel	State	Energy content in kJ per g	Mass in mg of CO_2 produced for one kJ of energy released
Methane	Gas	52	53
Petrol	Liquid	43	71

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Coal	Solid	24	93

Evaluate the use of the fuels.

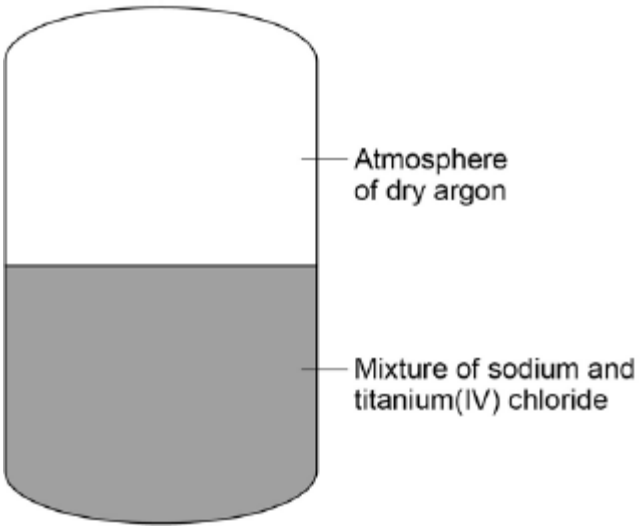
Use in the information in **Table 2** and your knowledge.

(6)
(Total 10 marks)

Q13.

Figure 1 shows a reactor used to produce titanium from titanium(IV) chloride.

Figure 1



The chemical equation for the reaction of titanium(IV) chloride with sodium is:

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$TiCl_4$ + 4Na → Ti + 4 NaCl

titanium(IV) chloride + sodium → titanium + sodium chloride

(a) For one reaction:

- 1615 kg titanium(IV) chloride reacted completely with 782 kg sodium
- 1989 kg sodium chloride was produced.

Calculate the mass of titanium produced from this reaction.

_____

_____

Mass of titanium = _____ kg

(1)

(b) The table below shows the solubility of sodium chloride in 100 cm^3 of aqueous solution at different temperatures.

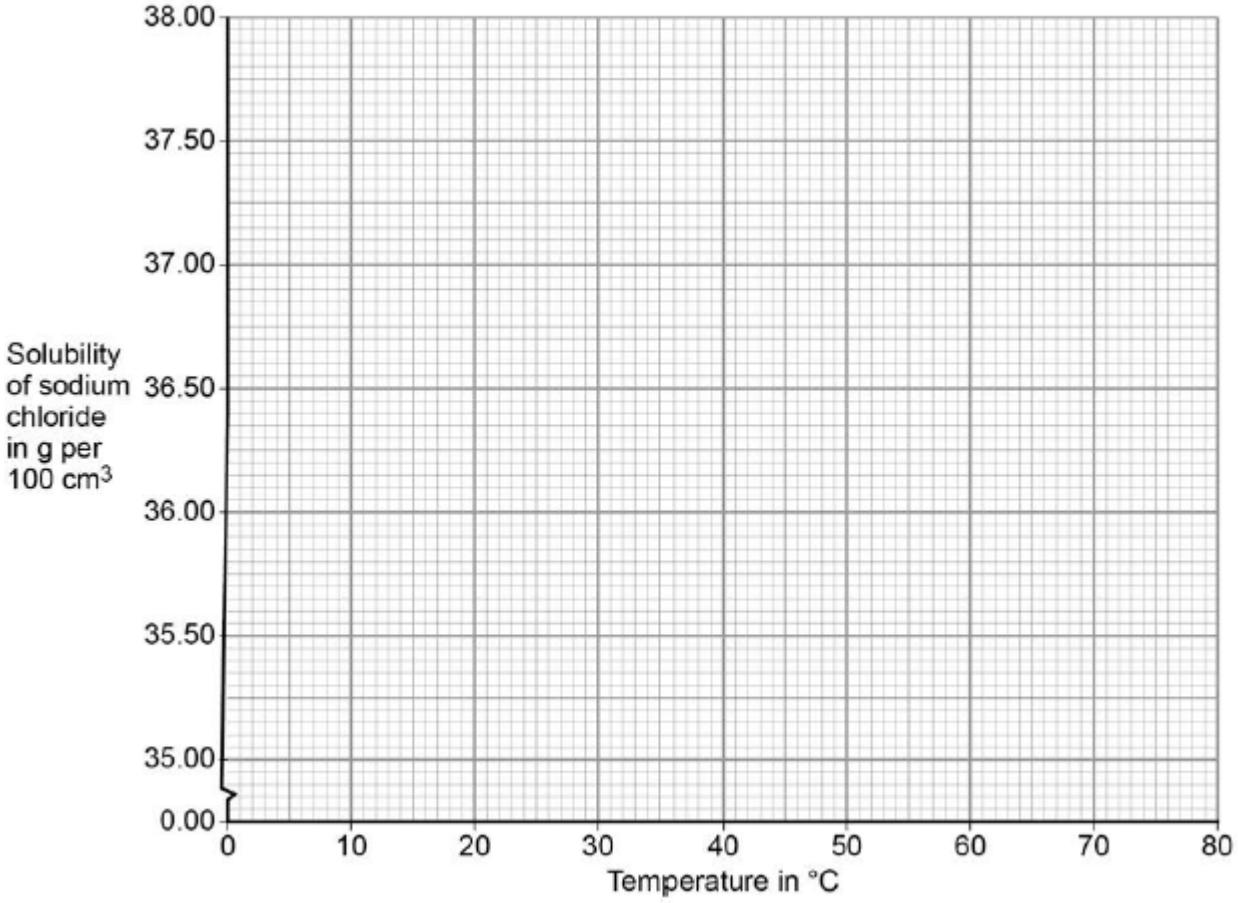
Solubility of sodium chloride in g per 100cm^3	**Temperature in °C**
35.72	10
35.89	20
36.09	30
37.37	40
36.69	50
37.04	60

On **Figure 2**:

- plot this data on the grid
- draw a line of best fit.

Figure 2

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(3)

(c) The product sodium chloride is dissolved in water to separate it from titanium.

At 30 °C the solubility of sodium chloride is 36 kg per 100 dm^3.

Calculate the minimum volume of water in dm^3, at 30 °C, needed to dissolve 1989 kg sodium chloride.

Volume of water = _____ dm^3

(2)

(d) Calculate the percentage by mass of titanium in titanium(IV) chloride ($TiCl_4$).

Give your answer to 3 significant figures.

Relative atomic masses (A_r): Cl = 35.5; Ti = 48

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Percentage of titanium by mass = _____ %

(3)

(e) Suggest why the reaction is done in an atmosphere of dry argon instead of air containing water vapour.

(3)

(f) Explain why titanium conducts electricity.

(3)

(Total 15 marks)

Q14.

Aqamed is a medicine for children.

(a) The medicine is a formulation.

What is meant by a formulation?

(1)

(b) Children often do not like taking medicine.

Suggest a substance that could be added to Aqamed to increase the desire for children to take it.

Give a reason for your suggestion.

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Substance _____

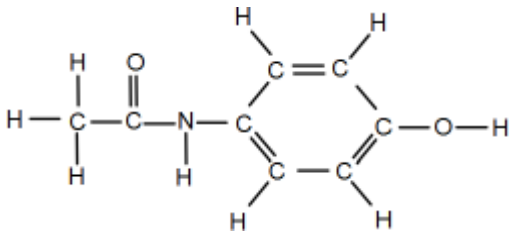
Reason _____

_____

(2)

(c) The main ingredient in Aqamed is a painkiller called paracetamol.

The figure below represents a molecule of paracetamol.



Give the molecular formula of paracetamol.

Calculate its relative formula mass (M_r).

Relative atomic masses (A_r): H = 1; C = 12; N = 14; O = 16

Molecular formula _____

Relative formula mass _____

_____

M_r = _____

(2)

(d) Aspirin is a medicine for use by adults.

An aspirin tablet contains 300 mg of acetylsalicylic acid.

Calculate the number of moles of acetylsalicylic acid in one aspirin tablet.

Give your answer in standard form to three significant figures.

Relative formula mass (M_r) of aspirin = 180

_____

_____

_____

_____

_____

_____

Number of moles = _____

(4)

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(Total 9 marks)

Q15.

Formulae and equations are used to describe chemical reactions.

(a) Aluminium reacts with sulfuric acid (H_2SO_4) to produce aluminium sulfate, $Al_2(SO_4)_3$ and hydrogen (H_2).

Complete and balance the equation for this reaction.

____Al + _____ ⟶ _____ + _____

(2)

(b) Calcium carbonate reacts with nitric acid to produce calcium nitrate.

Calculate the relative formula mass (M_r) of calcium nitrate, $Ca(NO_3)_2$

Relative atomic masses (A_r): N = 14; O = 16; Ca = 40

_____

_____

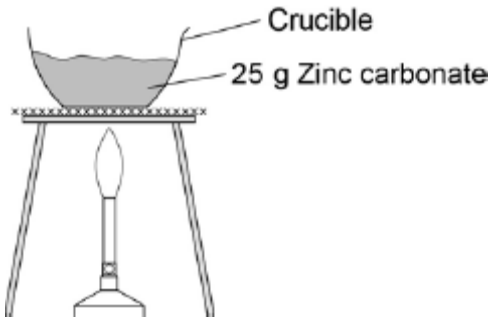
Relative formula mass (M_r) = _____

(2)

(c) Zinc carbonate decomposes when heated.

A student heated 25 g zinc carbonate ($ZnCO_3$).

The figure below shows how he set up the apparatus.



The balanced chemical equation for the decomposition reaction is:

$ZnCO_3$ (s) ⟶ ZnO (s) + CO_2 (g)

The student measured the mass of solid product after heating until there was no further change in mass.

The student did the experiment four times. The table below shows the results.

Experiment	1	2	3	4
Mass of solid product in g	17.4	19.7	17.6	16.9

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Calculate the mean mass of the solid product.

Do **not** use any anomalous results in your calculation.

Mean mass = _____ g

(2)

(Total 6 marks)

Q16.

The salt copper sulfate can be made by reacting copper carbonate with dilute sulfuric acid.

$$CuCO_3(s) + H_2SO_4(aq) \longrightarrow CuSO_4(aq) + H_2O(l) + CO_2(g)$$

(a) Write a method that a student could use to prepare a pure, dry sample of copper

You do **not** need to write a risk assessment or include safety points.

(6)

(b) Calculate the **number of molecules** in 14 g of carbon dioxide.

Give your answer in standard form.

Relative atomic masses (A_r): C = 14; O = 16

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Answer = _____ molecules

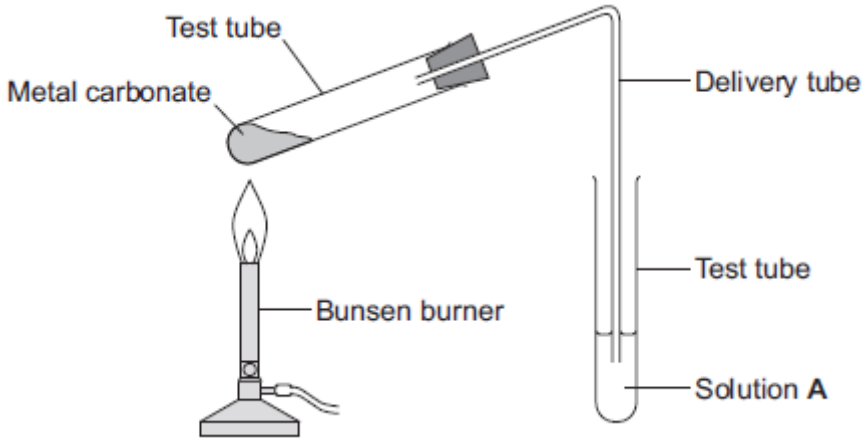
(4)

(Total 10 marks)

Q64.

A student investigated heating metal carbonates.

The student used the apparatus in the figure below.



The student's results are shown in the table below.

Metal carbonate	Colour before heating	Colour after heating	Mass before heating in g	Mass after heating in g	Solution A
Copper carbonate	Green	Black	12.4	8.0	Turns cloudy
Potassium carbonate	White	White	13.8	13.8	Stays colourless
Zinc carbonate	White	White	12.5	8.1	Turns cloudy

(a) Use the correct answer from the box to complete the sentence.

black **green** **white**

The colour of copper oxide is _____ .

(1)

(b) Solution **A** is used to test for carbon dioxide.

Carbon dioxide turns Solution **A** cloudy.

What is the name of Solution **A**?

_____

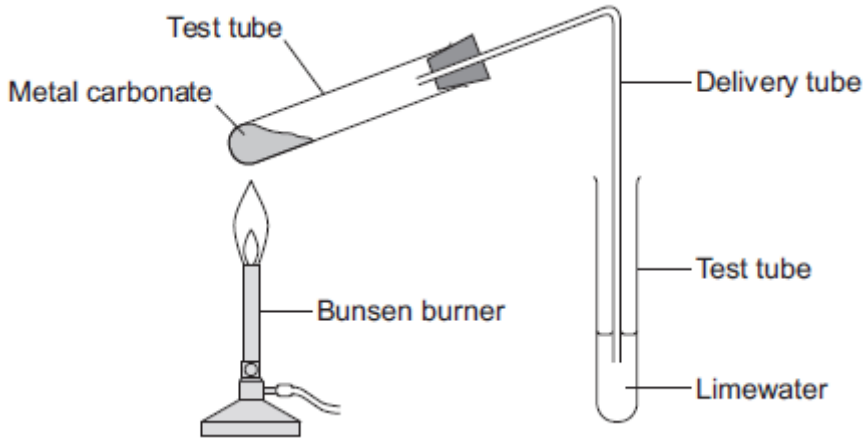
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(1)
(Total 2 marks)

Q65.

A student investigated heating metal carbonates.

The student used the apparatus in the figure below.



The student's results are shown in the table below.

Metal carbonate	Colour before heating	Colour after heating	Mass before heating in g	Mass after heating in g	Limewater
Copper carbonate	Green	Black	12.4	8.0	Turns cloudy
Potassium carbonate	White	White	13.8		
Zinc carbonate	White	White	12.5	8.1	

(a) Explain the observations seen when heating copper carbonate.

Include the names of the substances produced.

_____

_____

_____

_____

_____

_____

(3)

(b) (i) Potassium carbonate did **not** decompose when heated.

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State why.

_____

_____

(1)

(ii) Complete the table above to show the results you would expect the student to obtain.

(3)

(Total 7 marks)

Q66.

Many sea creatures have shells containing calcium carbonate.

Crab



© twobluedogs/iStock

Whelk



© Edward Westmacott

Scallop



© BobWes/iStock

(a) The seas are becoming more acidic.

Suggest and explain how acids affect the shells of sea creatures.

_____

_____

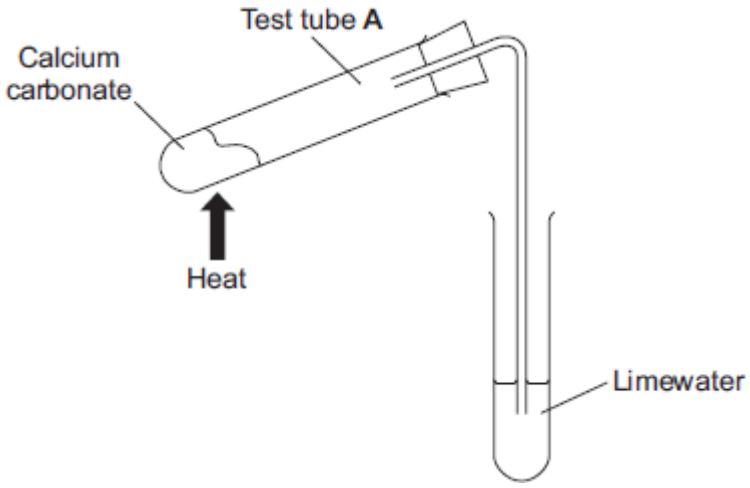
_____

_____

(2)

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(b) A student investigated the effect of heating calcium carbonate.



A student heated 10.0 g of calcium carbonate. At the end of the investigation, there was 5.6 g of a white powder in test tube **A**.

Explain how this information about masses shows that a gas was produced.

_____

_____

_____

_____

(2)

(Total 4 marks)

Q67.

The picture shows a limestone quarry.

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By Thomas Bjørkan (Own work) [CC-BY-SA-3.0], via Wikimedia Commons

(a) Local residents were against the opening of a new limestone quarry. The quarry was estimated to have a 10-year operating period.

The quarry company gave reasons to show how the quarry could benefit local residents over the next 10 to 15 years.

Suggest **one** economic and **one** environmental reason the quarry company could give.

Economic reason _____

_____

Environmental reason _____

_____

(2)

(b) What happens when limestone (calcium carbonate) is heated?

Include in your answer:

- the chemical names of the substances produced
- the name of the process.

_____

_____

_____

_____

(2)

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(c) (i) Lime is calcium oxide. Calcium oxide reacts with water to form calcium hydroxide, $Ca(OH)_2$

Write the symbol equation for this reaction.

_____ + _____ → _____

(2)

(ii) Name the gas that a solution of calcium hydroxide in water is used to test for.

Give the result that you would see if the gas was present.

_____

_____

_____

_____

(2)

(Total 8 marks)

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