Version 1.0

Surname		Other Names	
Centre Number			Candidate Number				
Candidate signature									

General Certificate of Secondary Education
Specimen Paper

SCIENCE A **CHY1A**
Unit 1a Chemistry (Products from Rocks)

CHEMISTRY
Unit 1a Chemistry (Products from Rocks)

Date and Time

For this paper you must have:
- a black ball-point pen
- an objective test answer sheet.

You may use a calculator.

Time allowed: 30 minutes

Instructions

- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title 'Products from Rocks' printed on it.
- Attempt **one Tier only**, **either** the Foundation Tier **or** the Higher Tier.
- Make sure that you use the correct side of the separate answer sheet; the Foundation Tier is printed on one side and the Higher Tier on the other.
- Answer **all** the questions for the Tier you are attempting.
- Record your answers on the separate answer sheet only.
- Do all rough work in this book, **not** on your answer sheet.

Instructions for recording answers

- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown: 1 2 3 4
- Do **not** extend beyond the circles.
- If you want to change your answer, **you must** cross out your original answer, as shown: 1 2 3 4
- If you change your mind about an answer you have crossed out and now want to choose it, draw a ring around the cross as shown: 1 2 3 4

Information

- The maximum mark for this paper is 36.

Advice

- Do **not** choose more responses than you are asked to. You will lose marks if you do.
- Make sure that you hand in both your answer sheet and this question paper at the end of the test.
- If you start to answer on the wrong side of the answer sheet by mistake, make sure that you cross out **completely** the work that is not to be marked.

You must do **one Tier** only, **either** the Foundation tier **or** the Higher Tier.
The Higher Tier starts on page 14 of this booklet.

FOUNDATION TIER

SECTION ONE

Questions **ONE** to **SIX**.

In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1 – 4**.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

QUESTION ONE

The table is about raw materials and substances made from them.

Match words, **A**, **B**, **C** and **D**, with the numbers **1 − 4** in the table.

A concrete

B glass

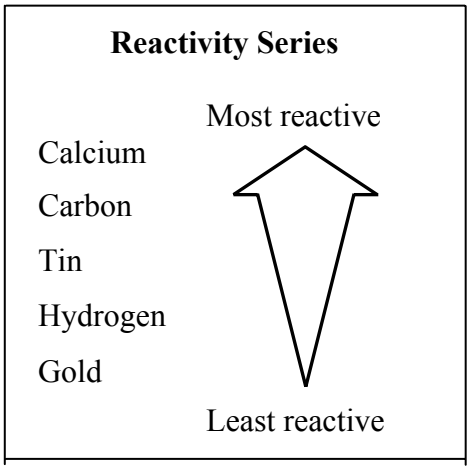
C limestone

D slaked lime

Substance	What we can say about the substance
1	it is made by heating together limestone, sand and soda
2	it is made from cement and used as a building material
3	it is made from quicklime and used to reduce the acidity of soils
4	it is quarried rock used as building material

QUESTION TWO

The diagram shows the reactivity of some elements.



Match words, **A**, **B**, **C** and **D**, with the numbers **1 – 4** in the table.

A calcium

B carbon

C gold

D tin

1	a metal that can be extracted from its ore by carbon but not by hydrogen
2	a metal that cannot be extracted from its ore by using carbon
3	a solid non-metal
4	it may be found in the ground as the metal itself

Turn over for the next question

QUESTION THREE

The flow chart shows some of the substances that can be made from limestone.

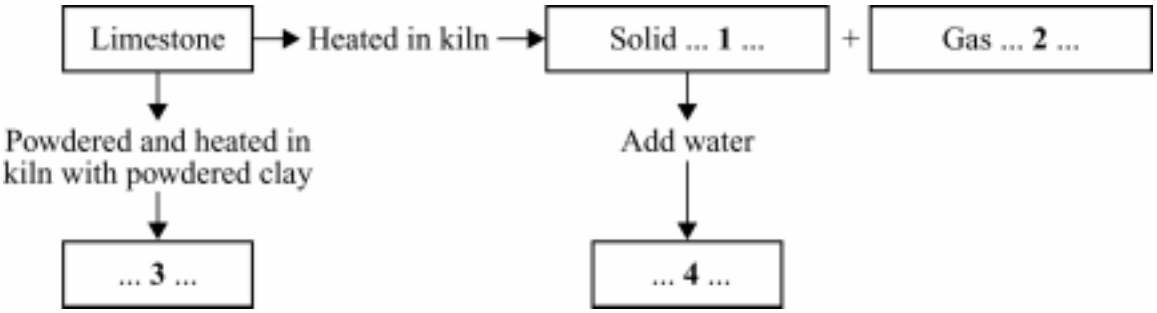
Match words, **A**, **B**, **C** and **D**, with the numbers **1 – 4** in the flow chart.

A calcium hydroxide

B calcium oxide

C carbon dioxide

D cement



QUESTION FOUR

Atoms join to other atoms to form molecules.

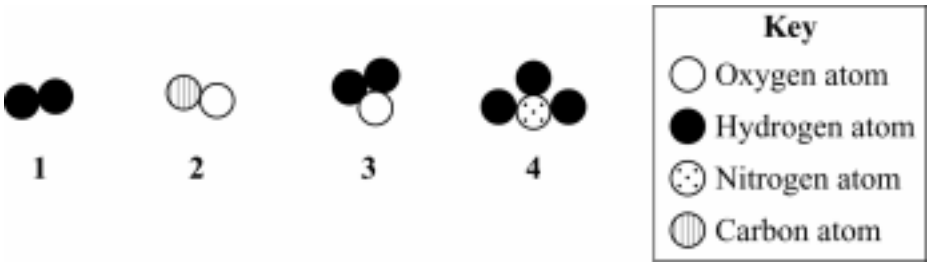
Match formulae, **A**, **B**, **C** and **D**, with the diagrams **1 – 4**.

A CO

B H_2

C H_2O

D NH_3



Turn over for the next question

QUESTION FIVE

We can get useful products from crude oil.

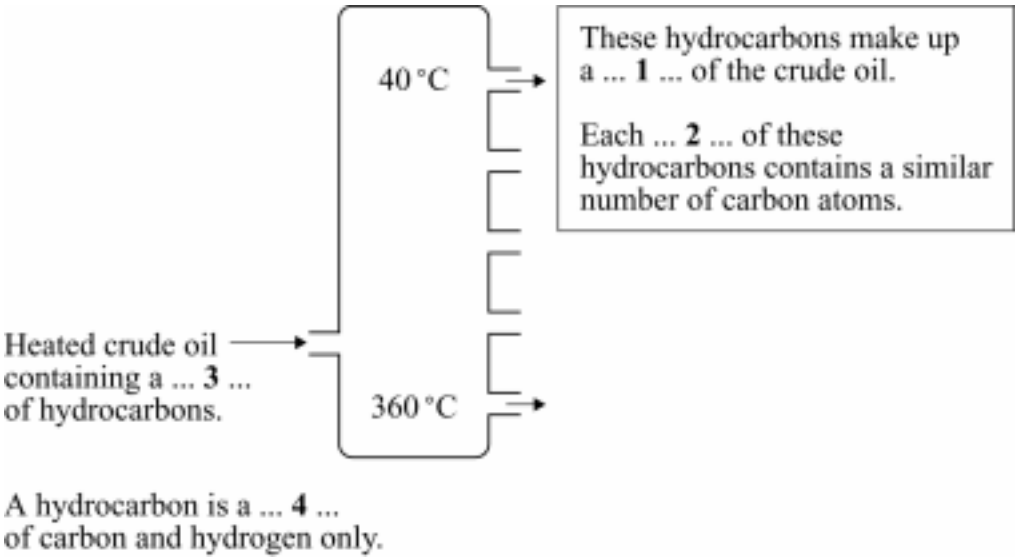
Match words, **A**, **B**, **C** and **D**, with the labels **1 – 4** on the diagram.

A compound

B fraction

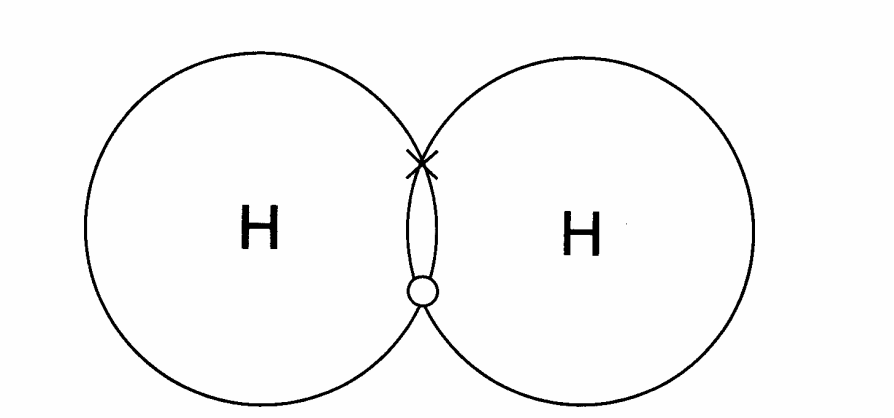
C mixture

D molecule



QUESTION SIX

The diagram shows a molecule of hydrogen.



Match words, **A**, **B**, **C** and **D**, with the numbers **1 – 4** in the sentences.

A bond

B electrons

C molecule

D nucleus

Each hydrogen atom has a small, central . . . **1** . . . .

The two hydrogen atoms each share . . . **2** . . . .

This sharing forms a chemical . . . **3** . . . between the two atoms.

The two joined atoms form a . . . **4** . . . . .

Turn over for the next question

SECTION TWO

Questions **SEVEN** to **NINE**.

Each of these questions has four parts.

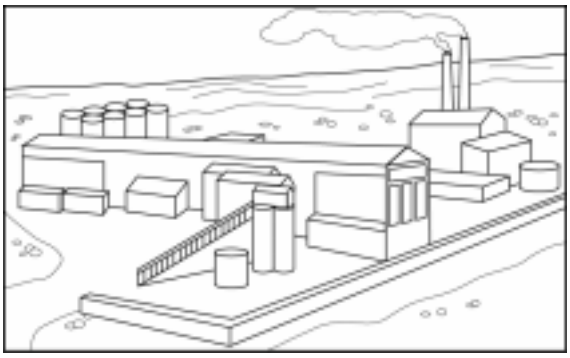
In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION SEVEN

Producing cement affects the environment.

The drawing shows a cement works next to a limestone quarry.



7A Quarrying limestone affects the environment at this site mainly by causing . . .

1 air pollution.

2 land pollution.

3 visual pollution.

4 water pollution.

7B Producing cement in the kiln will produce . . .

1 air pollution.

2 land pollution.

3 noise pollution.

4 water pollution.

7C Producing cement at this site uses . . .

1 energy resources only.

2 energy resources and renewable materials.

3 energy sources and non-renewable materials.

4 renewable materials only.

7D The cement is transported away from the works by a fleet of lorries.

The lorries cause mainly . . .

1 air pollution and land pollution.

2 air pollution and noise pollution.

3 air pollution and visual pollution.

4 air pollution and water pollution.

Turn over for the next question

QUESTION EIGHT

Julie heated some limestone.
The limestone decomposed to form calcium oxide and carbon dioxide.
The limestone was weighed before and after being heated.

The table shows Julie's results.

	Experiment 1	**Experiment 2**
Mass of limestone before heating in grams	2.00	2.00
Mass of limestone after heating in grams	1.12	
Mass lost in grams	0.88	0.90

8A Which type of balance would be best for doing this experiment?

1 0 – 100 g measuring to the nearest 0.01 g

2 0 – 100 g measuring to the nearest 0.1 g

3 0 – 500 g measuring to the nearest g

4 0 – 1000 g measuring to the nearest 10 g

8B What was the mass of limestone after heating in **Experiment 2**?

1 0.88 g

2 0.90 g

3 1.10 g

4 1.12 g

8C What mass of carbon dioxide was formed in **Experiment 1**?

1 0.88 g

2 0.90 g

3 1.10 g

4 1.12 g

8D What is the best conclusion to Julie's experiment?

1 Heating 2.00 g of limestone results in a loss in mass of 0.88 g.

2 Heating 2.00 g of limestone results in a loss in mass of 0.90 g.

3 Heating 2.00 g of limestone results in an average loss of 0.89 g.

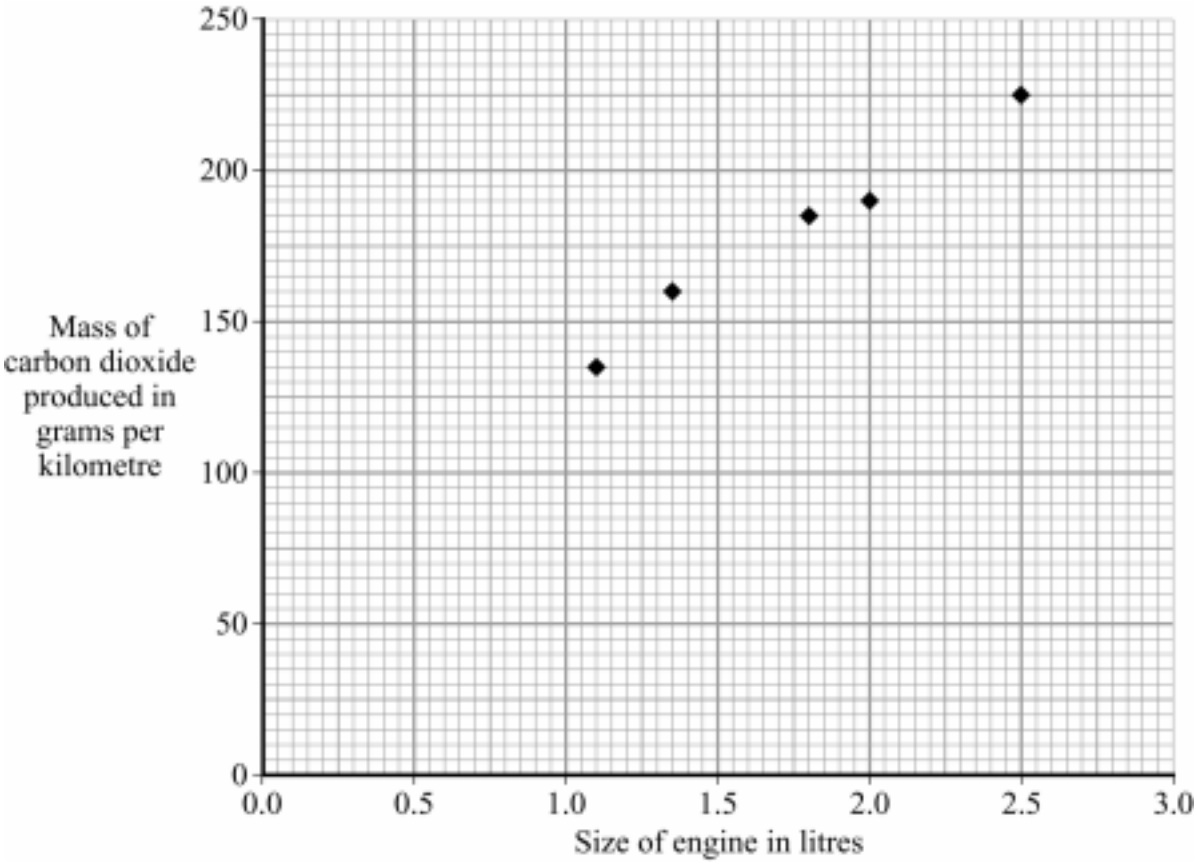
4 Heating 2.00 g of limestone results in a different loss in mass each time.

Turn over for the next question

QUESTION NINE

Most cars use either petrol or diesel as fuel.

The graph gives information about the mass of carbon dioxide produced by different sizes of petrol engine.



9A What mass of carbon dioxide is produced by a car with a 2.0 litre petrol engine on a 10 km school run?

1 155 g

2 190 g

3 1900 g

4 2350 g

9B What is the best estimate of the mass of carbon dioxide that would be produced by a 1.0 litre petrol engine?

1 60 grams per kilometre

2 125 grams per kilometre

3 140 grams per kilometre

4 170 grams per kilometre

9C What is the relationship, if any, between petrol engine size and the mass of carbon dioxide produced?

1 They are directly proportional.

2 They are inversely proportional.

3 There is a correlation between engine size and mass of carbon dioxide produced.

4 There is no relationship between the two.

9D A 2.0 litre diesel engine produces 156 grams of carbon per kilometre.

What is the best conclusion that can be drawn from this?

1 Diesel engines produce less carbon dioxide than petrol engines.

2 Petrol engines produce less carbon dioxide than diesel engines.

3 The mass of carbon dioxide produced by an engine depends on both the size of the engine and the type of fuel.

4 The mass of carbon dioxide produced by an engine depends only on the type of fuel.

END OF TEST

You must do **one Tier** only, **either** the Foundation tier **or** the Higher Tier.
The Foundation Tier is earlier in this booklet.

HIGHER TIER

SECTION ONE

Questions **ONE** and **TWO**

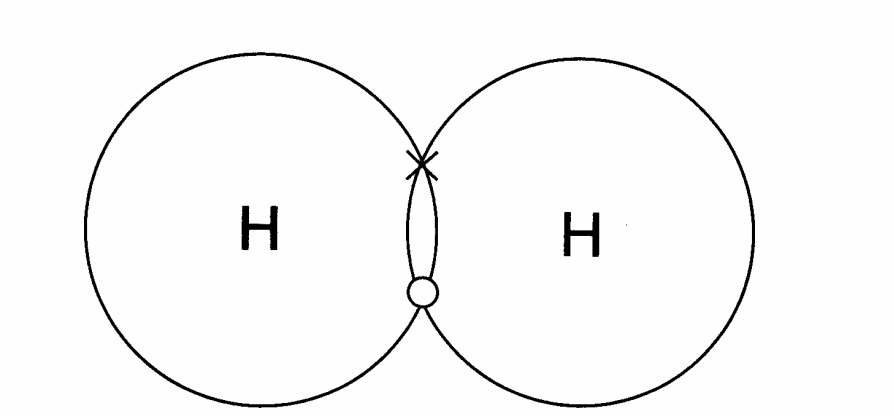
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1 – 4**.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

QUESTION ONE

The diagram shows a molecule of hydrogen.



Match words, **A**, **B**, **C** and **D**, with the numbers **1 – 4** in the sentences.

A bond

B electrons

C molecule

D nucleus

Each hydrogen atom has a small, central . . . **1** . . . .

The two hydrogen atoms each share . . . **2** . . . .

This sharing forms a chemical . . . **3** . . . between the two atoms.

The two joined atoms form a . . . **4** . . . . .

QUESTION TWO

Match words, **A**, **B**, **C** and **D**, with the numbers **1 – 4** in the sentences.

A condense

B evaporation

C fractional distillation

D fractions

The many hydrocarbons in crude oil may be separated into . . . **1** . . . , each of which contain molecules with a similar number of carbon atoms, by . . . **2** . . . of the oil and allowing it to . . . **3** . . . at a number of different temperatures.
This process is called . . . **4** . . . .

Turn over for the next question

SECTION TWO

Questions **THREE** to **NINE**.

Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION THREE

Julie heated some limestone.
The limestone decomposed to form calcium oxide and carbon dioxide.
The limestone was weighed before and after being heated.

The table shows Julie's results.

	Experiment 1	**Experiment 2**
Mass of limestone before heating in grams	2.00	2.00
Mass of limestone after heating in grams	1.12	
Mass lost in grams	0.88	0.90

3A Which type of balance would be best for doing this experiment?

1 0 – 100 g measuring to the nearest 0.01 g

2 0 – 100 g measuring to the nearest 0.1 g

3 0 – 500 g measuring to the nearest g

4 0 – 1000 g measuring to the nearest 10 g

3B What was the mass of limestone after heating in **Experiment 2**?

1 0.88 g

2 0.90 g

3 1.10 g

4 1.12 g

3C What mass of carbon dioxide was formed in **Experiment 1**?

1 0.88 g

2 0.90 g

3 1.10 g

4 1.12 g

3D What is the best conclusion to Julie's experiment?

1 Heating 2.00 g of limestone results in a loss in mass of 0.88 g.

2 Heating 2.00 g of limestone results in a loss in mass of 0.90 g.

3 Heating 2.00 g of limestone results in an average loss of 0.89 g.

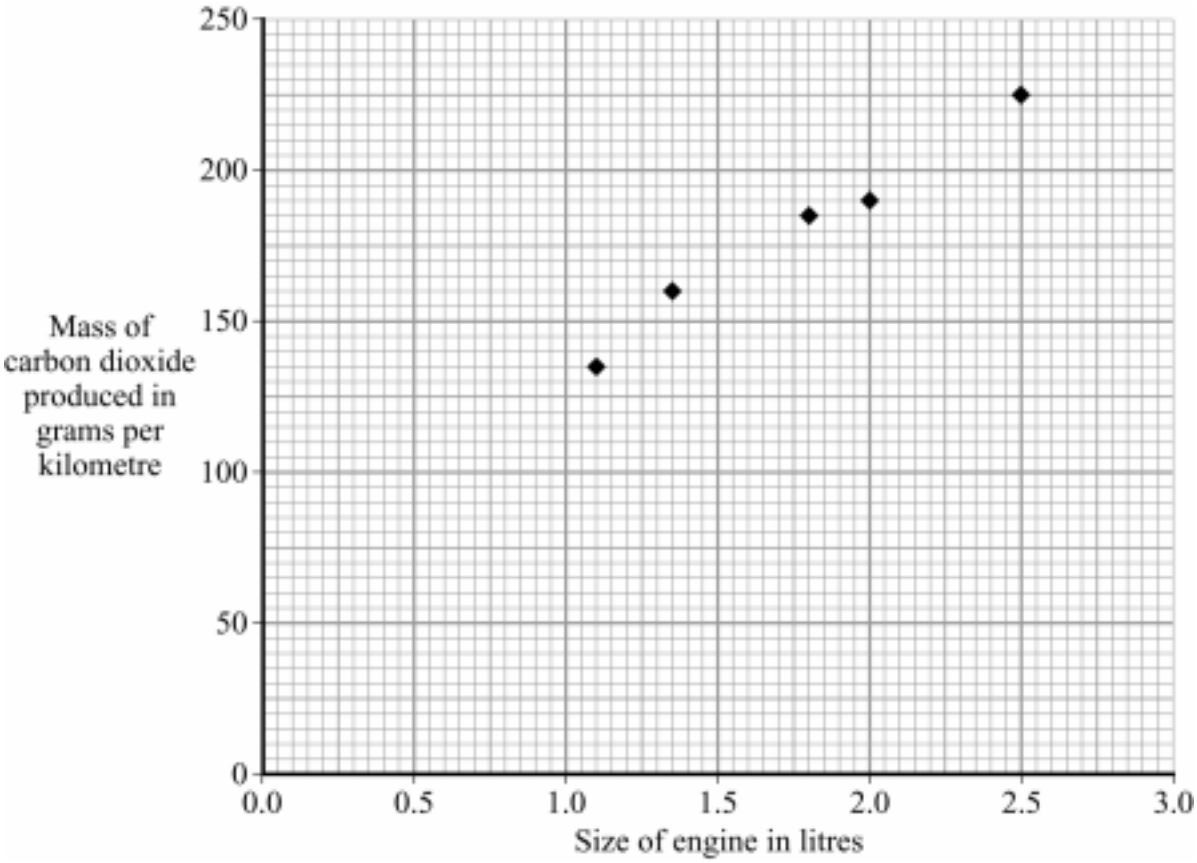
4 Heating 2.00 g of limestone results in a different loss in mass each time.

Turn over for the next question

QUESTION FOUR

Most cars use either petrol or diesel as fuel.

The graph gives information about the mass of carbon dioxide produced by different sizes of petrol engine.



4A What mass of carbon dioxide is produced by a car with a 2.0 litre petrol engine on a 10 km school run?

1 155 g

2 190 g

3 1900 g

4 2350 g

4B What is the best estimate of the mass of carbon dioxide that would be produced by a 1.0 litre petrol engine?

1 60 grams per kilometre

2 125 grams per kilometre

3 140 grams per kilometre

4 170 grams per kilometre

4C What is the relationship, if any, between petrol engine size and the mass of carbon dioxide produced?

1 They are directly proportional.

2 They are inversely proportional.

3 There is a correlation between engine size and mass of carbon dioxide produced.

4 There is no relationship between the two.

4D A 2.0 litre diesel engine produces 156 grams of carbon per kilometre.

What is the best conclusion that can be drawn from this?

1 Diesel engines produce less carbon dioxide than petrol engines.

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3 The mass of carbon dioxide produced by an engine depends on both the size of the engine and the type of fuel.

4 The mass of carbon dioxide produced by an engine depends only on the type of fuel.

Turn over for the next question

QUESTION FIVE

This question is about burning and the products of burning.

5A About 20 % of the air is . . .

1 carbon dioxide.

2 nitrogen.

3 oxygen.

4 sulfur dioxide.

5B When carbon in a fuel burns in air the reaction can be represented by this word equation:

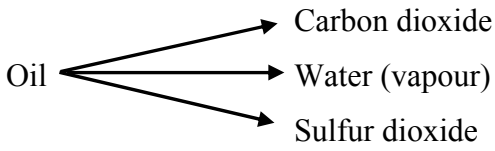
1 carbon + oxygen → carbonic acid

2 carbon dioxide → carbon + oxygen

3 carbon + oxygen → carbon dioxide

4 carbon + oxygen → calcium carbonate

5C These are the three main substances produced when most fuels are burned:



The products of these reactions are all . . .

1 carbonates.

2 hydroxides.

3 oxides.

4 sulfides.

5D Burning fuels release solid particles which . . .

1 cause acid rain.

2 cause global dimming.

3 cause global warming.

4 cause water pollution.

Turn over for the next question

QUESTION SIX

Alloys often have more useful properties than pure metals.

6A Mixtures of metals are called . . .

1 alloys.

2 catalysts.

3 compounds.

4 ores.

6B One metal mixed with iron to make stainless steel is . . .

1 aluminium.

2 calcium.

3 chromium.

4 potassium.

6C Low carbon steel is . . .

1 easily shaped.

2 hard.

3 resistant to corrosion.

4 resistant to staining.

6D Smart alloys . . .

1 can adapt to new situations.

2 can easily be bent.

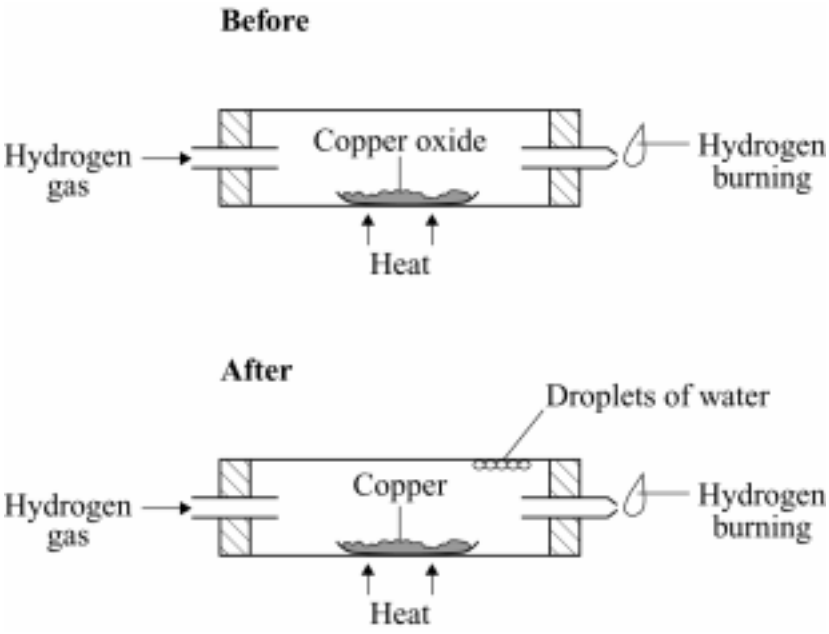
3 can resist most chemicals.

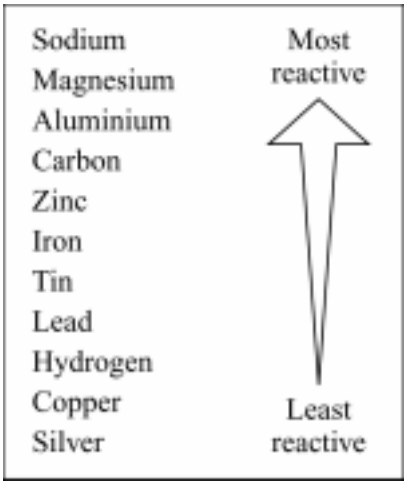
4 can return to their original shape after being deformed.

Turn over for the next question

QUESTION SEVEN

The drawings show how hydrogen can be used to displace a metal from one of its compounds.





7A In the reaction shown, the hydrogen is . . .

1 dehydrated.

2 neutralised.

3 oxidised.

4 reduced.

7B The symbol equation for the reaction is . . .

1 $Cu + H_2 \rightarrow CuO$

2 $Cu + H_2 \rightarrow CuO + H_2O$

3 $CuO + H_2 \rightarrow Cu + H_2O$

4 $CuO + H_2O \rightarrow Cu + H_2$

7C Which of these metals could be displaced from its oxide by carbon but not by hydrogen?

1 aluminium

2 lead

3 magnesium

4 sodium

7D Which metal cannot be extracted from its oxide using carbon?

1 copper

2 sodium

3 tin

4 zinc

Turn over for the next question

QUESTION EIGHT

Crude oil can be separated into fractions.

Each fraction contains several different hydrocarbons.

Fraction of crude oil	**Number of carbon atoms in each hydrocarbon molecule**
Petrol	$C_4 - C_{12}$
Paraffin	$C_{11} - C_{15}$
Diesel oil	$C_{14} - C_{19}$
Bitumen	C_{50} and upwards

8A Crude oil can be separated into fractions by fractional distillation because . . .

1 the fractions flow at different rates.

2 the fractions have different boiling points.

3 the fractions have different colours.

4 the fractions have different densities.

8B Hydrocarbons with the smallest molecules will be found in . . .

1 the bitumen fraction.

2 the diesel fraction.

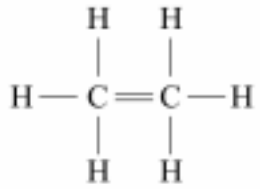
3 the paraffin fraction.

4 the petrol fraction.

The formula for hydrocarbon **X** is C_2H_6

8C The structural formula for hydrocarbon **X** is . . .

1



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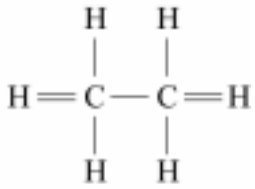

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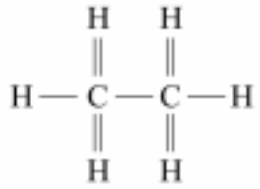

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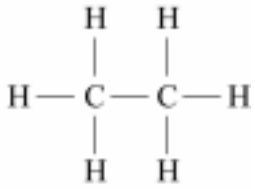

8D Which of these hydrocarbons belongs to the same group as hydrocarbon **X**?

1 C_3H_8

2 C_4H_8

3 C_5H_{10}

4 C_6H_{12}

Turn over for the next question

QUESTION NINE

Read the information below about recycling metals.

> Recycling scrap steel reduces related water pollution, air pollution and mining wastes by about 70%. It takes four times as much energy to make steel from iron ore than from recycled steel.
>
> Recycling cans made from tin-plated steel saves 74% of the energy needed to produce these cans from raw materials. 80% of the tin is recovered from recycled cans.
>
> Every time a tonne of steel is recycled, 2000 kg of iron ore, 500 kg of coal and 20 kg of limestone are conserved.
>
> The recycling process simply involves melting the scrap steel then removing impurities.

9A What mass of raw materials is preserved when one tonne of steel is recycled?

1 20 kg

2 500 kg

3 2000 kg

4 2520 kg

9B A tin-coated can has a mass of 10 g. 1% of this mass is tin.

How much tin is saved by the recycling of one tin can?

1 0.008 g

2 0.08 g

3 0.8 g

4 8.0g

9C In the manufacture of iron, carbon is used to displace oxygen from iron oxide.

Which pollutant gas is formed during this reaction?

1 carbon dioxide

2 nitrogen

3 oxygen

4 sulfur dioxide

9D Recycling scrap needs much less energy than making steel from iron ore.

This is because . . .

1 iron in iron ore needs to be oxidised.

2 iron in scrap iron has already been displaced from its oxide.

3 iron in scrap iron only needs to be oxidised.

4 there are fewer impurities in scrap iron.

END OF TEST

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FOUNDATION TIER

Instructions on how to complete this answer sheet are given on the question paper. Please make sure you follow them carefully.

QUESTION ONE	1	2	3	4
A concrete	○	○	○	○
B glass	○	○	○	○
C limestone	○	○	○	○
D slaked lime	○	○	○	○

QUESTION TWO	1	2	3	4
A calcium	○	○	○	○
B carbon	○	○	○	○
C gold	○	○	○	○
D tin	○	○	○	○

QUESTION THREE	1	2	3	4
A calcium hydroxide	○	○	○	○
B calcium oxide	○	○	○	○
C carbon dioxide	○	○	○	○
D cement	○	○	○	○

QUESTION FOUR	1	2	3	4
A CO	○	○	○	○
B H_2	○	○	○	○
C H_2O	○	○	○	○
D NH_3	○	○	○	○

QUESTION FIVE	1	2	3	4
A compound	○	○	○	○
B fraction	○	○	○	○
C mixture	○	○	○	○
D molecule	○	○	○	○

QUESTION SIX	1	2	3	4
A bond	○	○	○	○
B electrons	○	○	○	○
C molecule	○	○	○	○
D nucleus	○	○	○	○

QUESTION SEVEN	1	2	3	4
A	○	○	○	○
B	○	○	○	○
C	○	○	○	○
D	○	○	○	○

QUESTION EIGHT	1	2	3	4
A	○	○	○	○
B	○	○	○	○
C	○	○	○	○
D	○	○	○	○

QUESTION NINE	1	2	3	4
A	○	○	○	○
B	○	○	○	○
C	○	○	○	○
D	○	○	○	○

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OTQ03

GCSE SCIENCE

AQA ASSESSMENT and QUALIFICATIONS ALLIANCE

Unit : CHY1A – Chemistry 1a

Date/Series :

Centre :

Candidate Number : **UCI :**

Candidate Name :

For completion by the Examination Invigilator. **Please fill this oval if the candidate is absent:** ○

HIGHER TIER

Instructions on how to complete this answer sheet are given on the question paper. Please make sure you follow them carefully.

QUESTION ONE	1	2	3	4
A bond	○	○	○	○
B electrons	○	○	○	○
C molecule	○	○	○	○
D nucleus	○	○	○	○

QUESTION TWO	1	2	3	4
A condense	○	○	○	○
B evaporation	○	○	○	○
C fractional distillation	○	○	○	○
D fractions	○	○	○	○

QUESTION THREE	1	2	3	4
A	○	○	○	○
B	○	○	○	○
C	○	○	○	○
D	○	○	○	○

QUESTION FOUR	1	2	3	4
A	○	○	○	○
B	○	○	○	○
C	○	○	○	○
D	○	○	○	○

QUESTION FIVE	1	2	3	4
A	○	○	○	○
B	○	○	○	○
C	○	○	○	○
D	○	○	○	○

QUESTION SIX	1	2	3	4
A	○	○	○	○
B	○	○	○	○
C	○	○	○	○
D	○	○	○	○

QUESTION SEVEN	1	2	3	4
A	○	○	○	○
B	○	○	○	○
C	○	○	○	○
D	○	○	○	○

QUESTION EIGHT	1	2	3	4
A	○	○	○	○
B	○	○	○	○
C	○	○	○	○
D	○	○	○	○

QUESTION NINE
A ○
B ○
C ○
D ○

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SCIENCE A (4461)/CHEMISTRY (4421)

Objective Test Answer Key

CHY1A (Products from Rocks)

Specimen Paper

Foundation Tier

Question	Key		
One	**A**	concrete	**2**
	B	glass	**1**
	C	limestone	**4**
	D	slaked lime	**3**
Two	**A**	calcium	**2**
	B	carbon	**3**
	C	gold	**4**
	D	tin	**1**
Three	**A**	calcium hydroxide	**4**
	B	calcium oxide	**1**
	C	carbon dioxide	**2**
	D	cement	**3**
Four	**A**	CO	**2**
	B	H_2	**1**
	C	H_2O	**3**
	D	NH_3	**4**
Five	**A**	compound	**4**
	B	fraction	**1**
	C	mixture	**3**
	D	molecule	**2**
Six	**A**	bond	**3**
	B	electrons	**2**
	C	molecule	**4**
	D	nucleus	**1**

	A	**B**	**C**	**D**
Seven	**3**	**1**	**3**	**2**
Eight	**1**	**3**	**1**	**3**
Nine	**3**	**2**	**3**	**3**

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SCIENCE A (4461)/CHEMISTRY (4421)

Objective Test Answer Key

CHY1A (Products from Rocks)

Specimen Paper

Higher Tier

Question	Key		
One	**A**	bond	**3**
	B	electrons	**2**
	C	molecule	**4**
	D	nucleus	**1**
Two	**A**	condense	**3**
	B	evaporation	**2**
	C	fractional distillation	**4**
	D	fractions	**1**

	A	B	C	D
Three	**1**	**3**	**1**	**3**
Four	**3**	**2**	**3**	**3**
Five	**3**	**3**	**3**	**2**
Six	**1**	**3**	**1**	**4**
Seven	**3**	**3**	**2**	**2**
Eight	**2**	**4**	**4**	**1**
Nine	**4**	**2**	**1**	**2**

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