

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education  
June 2009



**SCIENCE A**  
**Unit Chemistry C1a (Products from Rocks)**

**CHY1AP**

**CHEMISTRY**  
**Unit Chemistry C1a (Products from Rocks)**

Monday 22 June 2009 Morning Session

**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

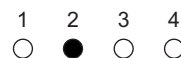
### Instructions

- 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 'Chemistry Unit 1a' 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

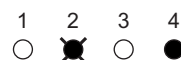
- Use a **black ball-point pen**.

- For each answer **completely fill in the circle** as shown:

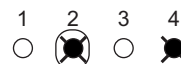


- Do **not** extend beyond the circles.

- If you want to change your answer, **you must** cross out your original answer, as shown:



- 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:



### 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.

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

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**FOUNDATION TIER**

**SECTION ONE**

Questions **ONE** to **FIVE**.

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.

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**QUESTION ONE**

This question is about limestone.

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

- A** calcium carbonate
- B** carbon dioxide
- C** calcium oxide
- D** calcium hydroxide

<b>1</b>	This is a gas made when limestone is heated strongly.
<b>2</b>	Limestone is mainly made up of this compound.
<b>3</b>	This is another name for slaked lime.
<b>4</b>	This is another name for quicklime.

**QUESTION TWO**

This question is about four metal ores.

	<b>Name of ore</b>	<b>Formula</b>	
<b>A</b>	Haematite	$\text{Fe}_2\text{O}_3$	Fe = iron; O = oxygen
<b>B</b>	Silver ore	Ag	Ag = silver
<b>C</b>	Chalcopyrite	$\text{CuFeS}_2$	Cu = copper; Fe = iron; S = sulfur
<b>D</b>	Bauxite	$\text{Al}_2\text{O}_3$	Al = aluminium; O = oxygen

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

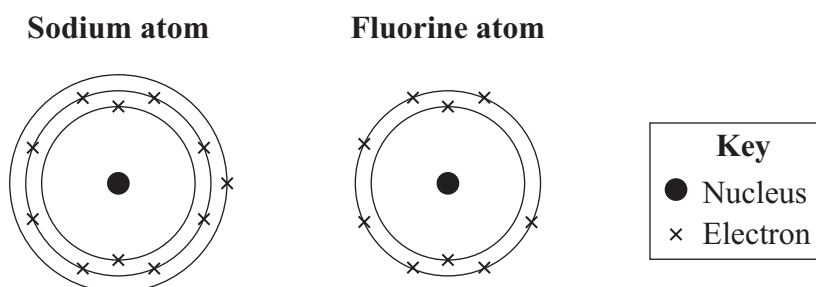
<b>1</b>	It contains two metals.
<b>2</b>	It is an oxide of iron.
<b>3</b>	It contains the uncombined metal.
<b>4</b>	It cannot be reduced by mixing with carbon then heating.

**Turn over for the next question**

**Turn over ►**

**QUESTION THREE**

The diagram shows a sodium atom and a fluorine atom.



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

- A** a compound
- B** an electron
- C** a bond
- D** an element

Fluorine is made of only one sort of atom. This means that it is . . . **1** . . . .

When sodium and fluorine react, the fluorine atom takes . . . **2** . . . from the sodium atom.

The atoms are then held together by . . . **3** . . . .

Sodium and fluorine combine together to form sodium fluoride, which is . . . **4** . . . .

**QUESTION FOUR**

This question is about some aspects of gold mining.

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

**A** environmentally

**B** politically

**C** ethically

**D** economically

A fall in the price of gold affects a mining company . . . **1** . . . .

Dumping the poisonous cyanide compounds used to extract gold is wrong . . . **2** . . . .

Government permission for gold mining in a country is . . . **3** . . . essential before mining can start.

Employing workers in unsafe working conditions is wrong . . . **4** . . . .

**QUESTION FIVE**

This question is about substances that can be burned in air.

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

**A**  $C_2H_5SH$

**B**  $C_2H_6$

**C**  $C_2H_2$

**D** C

<b>1</b>	It would contribute to the formation of acid rain when burned.
<b>2</b>	It is an alkane.
<b>3</b>	It corresponds to the general formula $C_nH_{2n-2}$
<b>4</b>	It forms only carbon dioxide when burned in air.

Turn over ►

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**SECTION TWO**Questions **SIX** to **NINE**.

Each of these questions has four parts.

In each part choose only **one** answer.Mark your choices on the answer sheet.

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**QUESTION SIX**

Hybrid cars have both battery-powered motors and petrol engines. Hybrid cars have been developed so they have reduced carbon dioxide emissions when compared with petrol and diesel cars.

Some figures from manufacturers' tests are shown in the table.

Hybrid car	Price	Fuel economy in km per litre of petrol	Carbon dioxide emissions in g per km
<b>K</b>	£18 000	21.6	109
<b>L</b>	£20 000	23.1	104
<b>M</b>	£11 000	26.1	99
<b>N</b>	£16 000	27.1	94

**6A** The best way to obtain accurate figures for the amount of carbon dioxide emitted by the cars is to drive each car . . .

- 1 100m.
- 2 1 km.
- 3 1 km five times, and take the highest value.
- 4 1 km five times, and take an average value.

**6B** For these cars, as the fuel economy in km per litre of petrol increases, . . .

- 1 the carbon dioxide emitted by the cars increases.
- 2 the carbon dioxide emitted by the cars decreases.
- 3 the cost of the cars increases.
- 4 the cars use more petrol per km.

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**6C** An independent motoring organisation tested the same cars. The values obtained for carbon dioxide emissions were a lot higher than those quoted by the manufacturers.

These values could be considered to be more reliable because the independent motoring organisation . . .

- 1 is **not** involved in selling cars.
- 2 is more concerned about environmental issues.
- 3 used equipment with a greater range.
- 4 is more likely to be biased.

**6D** One environmental advantage that a petrol hybrid car has over a conventional petrol car is that . . .

- 1 when the battery is working, no energy is being used.
- 2 the addition of a battery makes it lighter.
- 3 when only the battery is working, no carbon dioxide is being emitted.
- 4 the car will produce more sulfur dioxide.

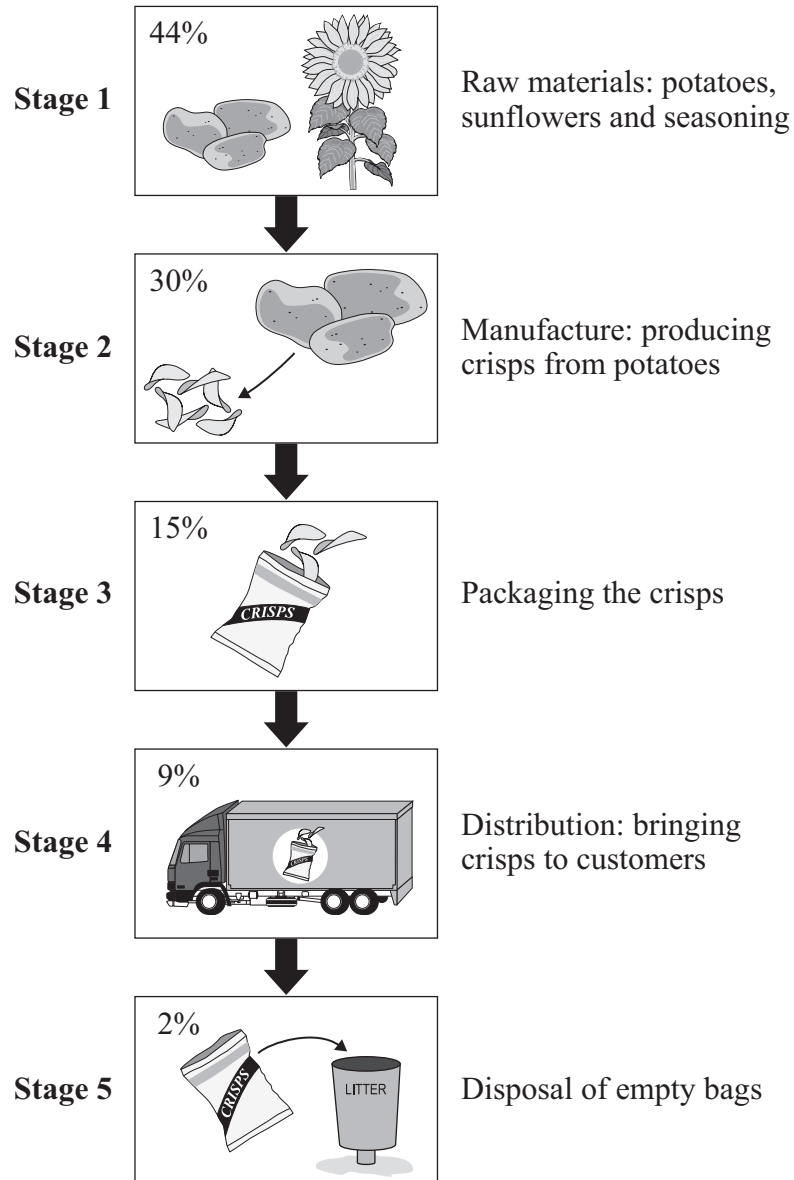
**Turn over for the next question**

**Turn over ►**

## QUESTION SEVEN

The carbon footprint of a food product is the amount of carbon dioxide that is produced in its preparation, distribution and disposal.

The diagram shows the percentage (%) of the carbon footprint for each stage for a bag of crisps.



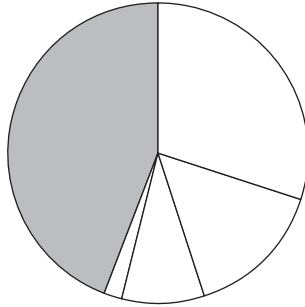
7A How is most of the carbon dioxide produced in **Stage 4**?

- 1 It is produced when the lorries use fuel.
- 2 It is breathed out by the driver.
- 3 It escapes from the crisp bags.
- 4 It escapes from the tyres of the lorries.



**7B** Which stage on the diagram corresponds to the shaded area on the pie chart?

**Percentage (%) of carbon footprint for a bag of crisps**



- 1 Stage 1
- 2 Stage 2
- 3 Stage 3
- 4 Stage 4

**7C** If the company reduces the carbon footprint for a bag of crisps, this will help to . . .

- 1 reduce the acid rain that it causes.
- 2 meet government targets on global warming.
- 3 reduce the sale of crisps which contribute to obesity.
- 4 reduce the use of sunflower oil.

**7D** Which of the following changes would reduce the carbon footprint for the bag of crisps?

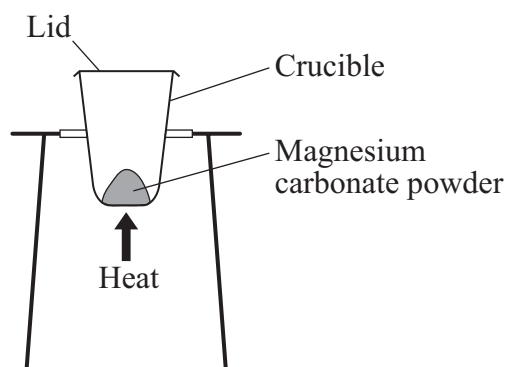
- 1 increase the sales of the crisps
- 2 change the colour of the crisp bags
- 3 pack many more bags of crisps into each lorry
- 4 increase the size of the lorry fleet

**Turn over ►**

**QUESTION EIGHT**

A student carried out an investigation using these instructions:

- weigh a crucible and lid
- put the sample of magnesium carbonate powder into the crucible
- weigh the crucible, lid and powder
- heat the crucible strongly
- allow to cool and weigh again
- repeat the heating, cooling and weighing until constant mass is achieved.



The student observed that the mass of the crucible and its contents decreased.

**8A** The substance remaining in the crucible after strong heating is . . .

- 1 magnesium.
- 2 magnesium oxide.
- 3 magnesium hydroxide.
- 4 carbon dioxide.

**8B** What caused the change in mass?

- 1 Some of the crucible burned away.
- 2 Water was given off.
- 3 Carbon dioxide was given off.
- 4 Some of the magnesium carbonate evaporated.

**8C** Why was the powder heated until constant mass was achieved?

- 1 to make sure that the magnesium carbonate had completely reacted
- 2 to make the test more reliable
- 3 to make sure that the balance was accurate
- 4 because the Bunsen burner was not hot enough

**8D** What type of reaction occurred in the crucible?

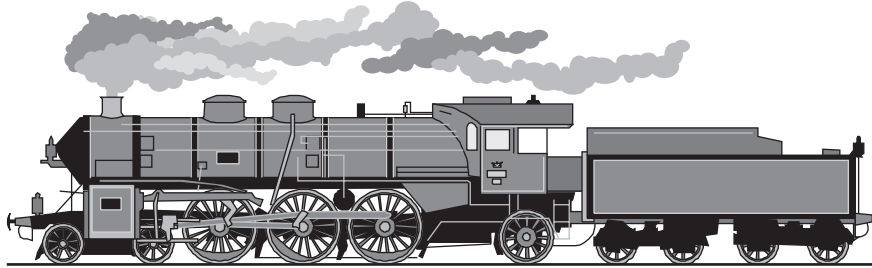
- 1 distillation
- 2 decomposition
- 3 combustion
- 4 evaporation

**Turn over for the next question**

**Turn over ►**

**QUESTION NINE**

Read the following newspaper extract.

**Copper shortage puts the brakes on Flying Scotsman renovation**

A major overhaul of the steam locomotive Flying Scotsman has been delayed by more than a year because of the lack of copper for the engine's firebox.

Copper is at a record high price because of huge demand from China's rapidly growing economy. The price had been falling over the previous 30 years, which had discouraged exploration for new supplies.

Other users have been forced to switch to cheaper materials, with plumbers using plastic rather than copper pipes, and telecoms firms using fibre-optic cables rather than copper wire.

**9A** The firebox of a steam locomotive is where coal is burned to boil water.

Which of these properties is **not** important when using copper in the firebox of a steam locomotive?

- 1 Copper is a good conductor of heat.
- 2 Copper has a high melting point.
- 3 Copper is a good conductor of electricity.
- 4 Copper is easily hammered and bent into shape.

**9B** Which row in the table explains why copper was important to plumbers and telecoms firms?

	<b>Plumbers</b>	<b>Telecoms firms</b>
<b>1</b>	High melting point	Good heat conductor
<b>2</b>	Good electrical conductor	High melting point
<b>3</b>	Resistant to corrosion	Good electrical conductor
<b>4</b>	High boiling point	Good electrical conductor

**9C** Which of the following would make the copper shortage in China and other countries worse?

- 1** recycling scrap copper rather than burying it in landfill sites
- 2** developing alternative materials to do the same job as copper
- 3** extraction of copper from low-grade ores
- 4** forcing suppliers to reduce the price of copper

**9D** Why is it environmentally important to recycle copper rather than mine fresh copper ore?

- 1** Copper ores are non-renewable, and a lot of energy is needed to extract copper from its ore.
- 2** There are enormous reserves of copper ore which are not expected to run out for hundreds of years.
- 3** Copper ores are cheap, and scrap copper is easy to dispose of in landfill sites.
- 4** Copper recycling is difficult and uses more energy when compared with processing new ores.

**END OF TEST**

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

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### 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.

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#### QUESTION ONE

This question is about substances that can be burned in air.

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

**A**  $\text{C}_2\text{H}_5\text{SH}$

**B**  $\text{C}_2\text{H}_6$

**C**  $\text{C}_2\text{H}_2$

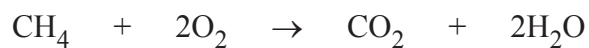
**D** C

<b>1</b>	It would contribute to the formation of acid rain when burned.
<b>2</b>	It is an alkane.
<b>3</b>	It corresponds to the general formula $\text{C}_n\text{H}_{2n-2}$
<b>4</b>	It forms only carbon dioxide when burned in air.

**QUESTION TWO**

Methane gas (CH<sub>4</sub>) burns in oxygen.

This is the chemical equation for the reaction:



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

**A** compounds

**B** bonds

**C** products

**D** elements

Methane and oxygen are the reactants but carbon dioxide and water are the . . . **1** . . . of the reaction.

The atoms in carbon dioxide and water are held together by . . . **2** . . . .

Methane, carbon dioxide and water are . . . **3** . . . .

The equation is balanced because in the reaction there is no change in the total number of atoms of each of the . . . **4** . . . .

**Turn over for the next question**

**Turn over ►**

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**SECTION TWO**Questions **THREE** to **NINE**.

Each of these questions has four parts.

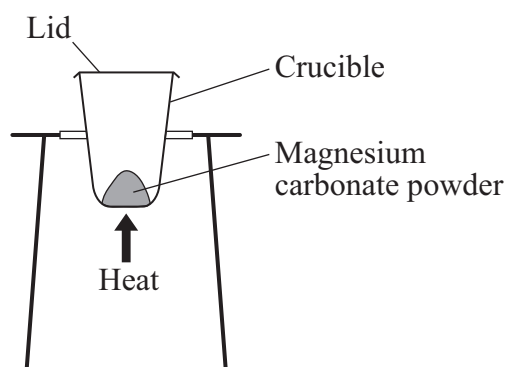
In each part choose only **one** answer.Mark your choices on the answer sheet.

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**QUESTION THREE**

A student carried out an investigation using these instructions:

- weigh a crucible and lid
- put the sample of magnesium carbonate powder into the crucible
- weigh the crucible, lid and powder
- heat the crucible strongly
- allow to cool and weigh again
- repeat the heating, cooling and weighing until constant mass is achieved.



The student observed that the mass of the crucible and its contents decreased.

**3A** The substance remaining in the crucible after strong heating is . . .

- 1 magnesium.
- 2 magnesium oxide.
- 3 magnesium hydroxide.
- 4 carbon dioxide.



**3B** What caused the change in mass?

- 1 Some of the crucible burned away.
- 2 Water was given off.
- 3 Carbon dioxide was given off.
- 4 Some of the magnesium carbonate evaporated.

**3C** Why was the powder heated until constant mass was achieved?

- 1 to make sure that the magnesium carbonate had completely reacted
- 2 to make the test more reliable
- 3 to make sure that the balance was accurate
- 4 because the Bunsen burner was not hot enough

**3D** What type of reaction occurred in the crucible?

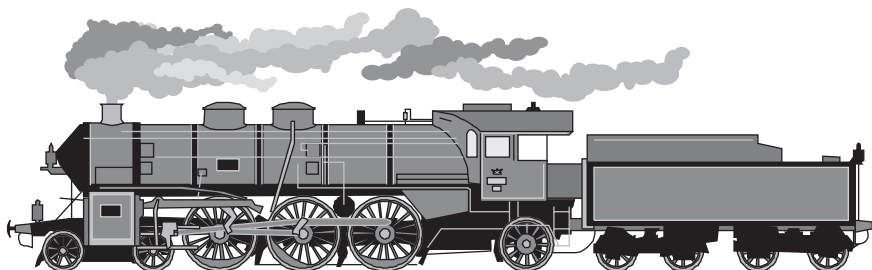
- 1 distillation
- 2 decomposition
- 3 combustion
- 4 evaporation

**Turn over for the next question**

**Turn over ►**

**QUESTION FOUR**

Read the following newspaper extract.

**Copper shortage puts the brakes on Flying Scotsman renovation**

A major overhaul of the steam locomotive Flying Scotsman has been delayed by more than a year because of the lack of copper for the engine's firebox.

Copper is at a record high price because of huge demand from China's rapidly growing economy. The price had been falling over the previous 30 years, which had discouraged exploration for new supplies.

Other users have been forced to switch to cheaper materials, with plumbers using plastic rather than copper pipes, and telecoms firms using fibre-optic cables rather than copper wire.

**4A** The firebox of a steam locomotive is where coal is burned to boil water.

Which of these properties is **not** important when using copper in the firebox of a steam locomotive?

- 1 Copper is a good conductor of heat.
- 2 Copper has a high melting point.
- 3 Copper is a good conductor of electricity.
- 4 Copper is easily hammered and bent into shape.

**4B** Which row in the table explains why copper was important to plumbers and telecoms firms?

	<b>Plumbers</b>	<b>Telecoms firms</b>
<b>1</b>	High melting point	Good heat conductor
<b>2</b>	Good electrical conductor	High melting point
<b>3</b>	Resistant to corrosion	Good electrical conductor
<b>4</b>	High boiling point	Good electrical conductor

**4C** Which of the following would make the copper shortage in China and other countries worse?

- 1 recycling scrap copper rather than burying it in landfill sites
- 2 developing alternative materials to do the same job as copper
- 3 extraction of copper from low-grade ores
- 4 forcing suppliers to reduce the price of copper

**4D** Why is it environmentally important to recycle copper rather than mine fresh copper ore?

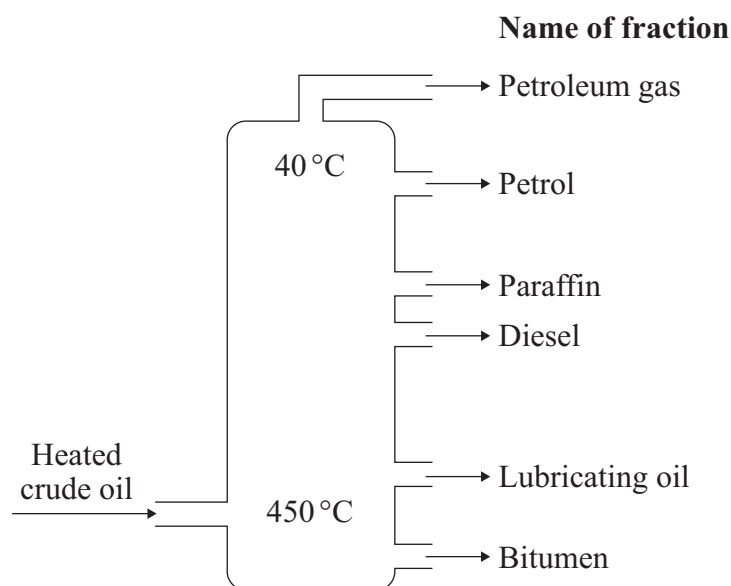
- 1 Copper ores are non-renewable, and a lot of energy is needed to extract copper from its ore.
- 2 There are enormous reserves of copper ore which are not expected to run out for hundreds of years.
- 3 Copper ores are cheap, and scrap copper is easy to dispose of in landfill sites.
- 4 Copper recycling is difficult and uses more energy when compared with processing new ores.

**Turn over for the next question**

**Turn over ►**

**QUESTION FIVE**

In a fractionating column, crude oil is separated into a number of fractions.



**5A** The crude oil separates into fractions in the fractionating column because . . .

- 1 it changes from a liquid to a vapour.
- 2 crude oil vapour condenses at 100 °C.
- 3 crude oil vapour condenses at different temperatures.
- 4 decomposition of the crude oil occurs.

**5B** The diesel fraction boils over a range of temperatures from about 250 °C to 340 °C.

The fraction does **not** have a fixed boiling point because . . .

- 1 the temperature in the fractionating column is **not** constant.
- 2 the hydrocarbons in the fraction have different chemical properties.
- 3 the fraction contains a mixture of hydrocarbons.
- 4 liquid hydrocarbons boil at temperatures above 250 °C.

**5C** The hydrocarbons from the bitumen fraction will . . .

- 1 be difficult to ignite at room temperature.
- 2 have small molecules.
- 3 be gases or liquids at room temperature.
- 4 have a small number of carbon atoms in each molecule.

**5D** A hydrocarbon from the lubricating oil fraction burns, in air, with a smoky flame.

This suggests that . . .

- 1 the hydrocarbon contains sulfur as an impurity.
- 2 there is only partial combustion of the hydrocarbon.
- 3 the hydrocarbon has small molecules.
- 4 when the hydrocarbon burns, it is oxidised.

**Turn over for the next question**

**Turn over ►**

**QUESTION SIX**

Two problems caused by the gases released when fossil fuels are burned are:

- acid rain, caused by sulfur dioxide and oxides of nitrogen
- global warming, caused by carbon dioxide.

Fuel manufacturers have introduced low-sulfur fuels to try to reduce the sulfur dioxide emissions.

**6A** Low-sulfur fuels were introduced in the UK in 2000. The amount of acid rain gases from transport increased from 2000 to 2004.

This increase could be due to . . .

- 1 the partial combustion of low-sulfur fuels.
- 2 an increasing number of vehicles on the UK's roads.
- 3 increasing emissions of carbon monoxide.
- 4 some sulfur dioxide not dissolving in rain water.

**6B** Carbon monoxide and oxides of nitrogen can be removed by a catalytic converter in the exhaust system of vehicles. The two gases, carbon monoxide (CO) and nitrogen dioxide (NO<sub>2</sub>), react to produce carbon dioxide (CO<sub>2</sub>) and nitrogen (N<sub>2</sub>).

The balanced equation that correctly describes this reaction is . . .

- 1  $\text{CO} + \text{NO}_2 \rightarrow \text{CO}_2 + \text{N}_2$
- 2  $2\text{CO} + \text{NO}_2 \rightarrow 2\text{CO}_2 + \text{N}_2$
- 3  $3\text{CO} + 2\text{NO}_2 \rightarrow 3\text{CO}_2 + \text{N}_2$
- 4  $4\text{CO} + 2\text{NO}_2 \rightarrow 4\text{CO}_2 + \text{N}_2$

**6C** The conversion of carbon monoxide and nitrogen dioxide to carbon dioxide and nitrogen will . . .

- 1 decrease acid rain and decrease global warming.
- 2 decrease acid rain and increase global warming.
- 3 increase acid rain and increase global warming.
- 4 increase acid rain and decrease global warming.

- 6D** Environmentalists have encouraged the use of hydrogen as a fuel instead of petrol because . . .
- 1 hydrogen is a renewable fuel obtained from sugar.
  - 2 carbon monoxide is the main product of combustion.
  - 3 no carbon dioxide is produced when hydrogen is burned.
  - 4 hydrogen produces only low levels of sulfur dioxide when burned.

**Turn over for the next question**

**Turn over ►**

**QUESTION SEVEN**

This question is about three metals, copper, lead and zinc.

**7A** Copper is found in the Earth's crust as the metal itself.

Lead and zinc are also found in the Earth's crust, but only as compounds such as oxides and sulfides.

These facts suggest that . . .

- 1 copper is a very reactive metal.
- 2 lead and zinc are transition metals, but copper is not.
- 3 lead and zinc react rapidly with oxygen and sulfur, but copper does not.
- 4 lead and zinc are more reactive than copper.

**7B** A naturally occurring compound of zinc is hydrozincite,  $2\text{ZnCO}_3 \cdot 3\text{Zn}(\text{OH})_2$

Which row in the table correctly shows the number of elements, and the number of atoms of oxygen in the formula for hydrozincite?

	<b>Number of elements</b>	<b>Number of atoms of oxygen</b>
<b>1</b>	4	12
<b>2</b>	4	8
<b>3</b>	5	5
<b>4</b>	6	4



**7C** Zinc is also found as zincite, ZnO.

The metal can be extracted from zincite by mixing it with carbon and heating strongly.

Which row in the table correctly shows the name for this process and the products?

	Name of process	Products
<b>1</b>	electrolysis	zinc and carbon dioxide
<b>2</b>	leaching	zinc and oxygen
<b>3</b>	reduction	zinc and oxygen
<b>4</b>	reduction	zinc and carbon dioxide

Lead and zinc compounds are often found together in the same ore.

The metals can be extracted by mixing the ore with carbon and heating strongly in a furnace. They can then be separated.

The table shows the melting points and boiling points of lead and zinc.

	Lead	Zinc
<b>Melting point in °C</b>	328	420
<b>Boiling point in °C</b>	1740	907

The furnace operates at a temperature of 1200 °C.

**7D** How will the lead and zinc be separated?

- 1** Molten lead remains in the furnace and the zinc evaporates.
- 2** Molten lead and molten zinc form two separate layers in the furnace.
- 3** Molten zinc remains in the furnace and the lead evaporates.
- 4** Zinc and lead vapours leave the furnace and are separated in a condenser.

Turn over ►

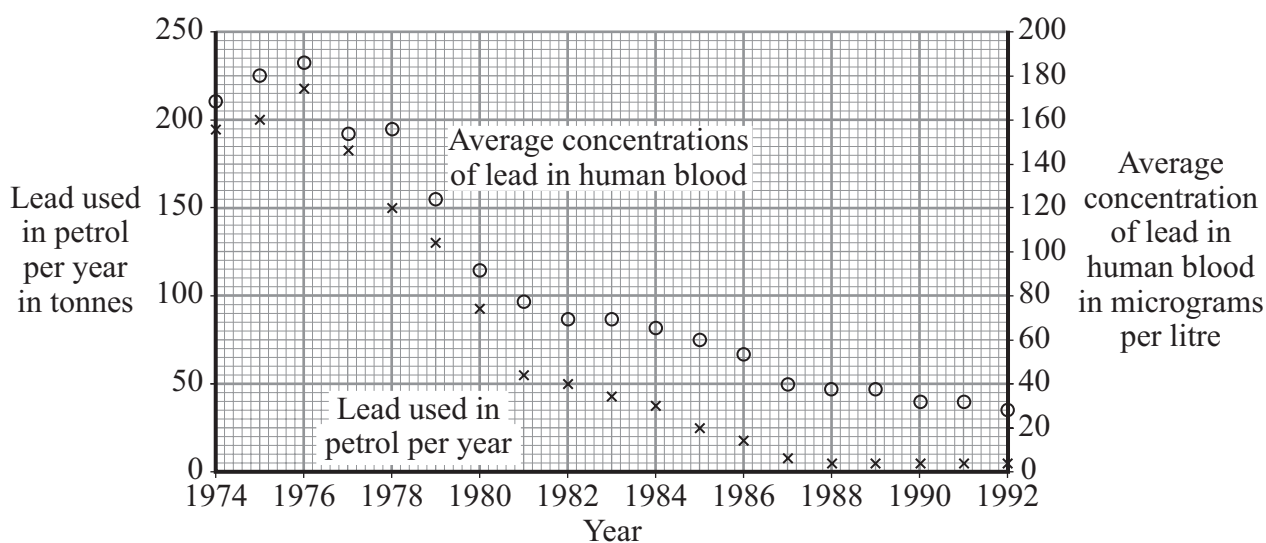
## QUESTION EIGHT

Lead compounds were added to petrol to improve its performance. The lead compounds leave the engine through the exhaust system.

During the 1970s, unleaded petrol was introduced, and between the 1970s and the 1990s leaded petrol was gradually removed from sale in petrol stations.

The information in the graph was collected from one area of North America between 1974 and 1992. The graph shows:

- the amounts of lead used in petrol (×)
- the average concentrations of lead in human blood (○).



**8A** What conclusion can be drawn from the graph?

- 1 Lead concentration in human blood is always greater than the amount of lead used.
- 2 There is a positive correlation between lead concentration in human blood and the year.
- 3 There is a positive correlation between the amount of lead used and the concentration of lead in human blood.
- 4 Lead concentration in human blood and the amount of lead used per year were almost the same in 1977.

- 8B** The lead concentration in human blood will probably **not** drop to zero because . . .
- 1 some people will store leaded petrol.
  - 2 lead will get into human blood from other sources.
  - 3 scientists find it difficult to measure small quantities of lead.
  - 4 lead concentrations rise when more unleaded petrol is burned during the summer months.

- 8C** The points plotted on the graph for the average concentration of lead in human blood are always above the points plotted for the amount of lead used in petrol.

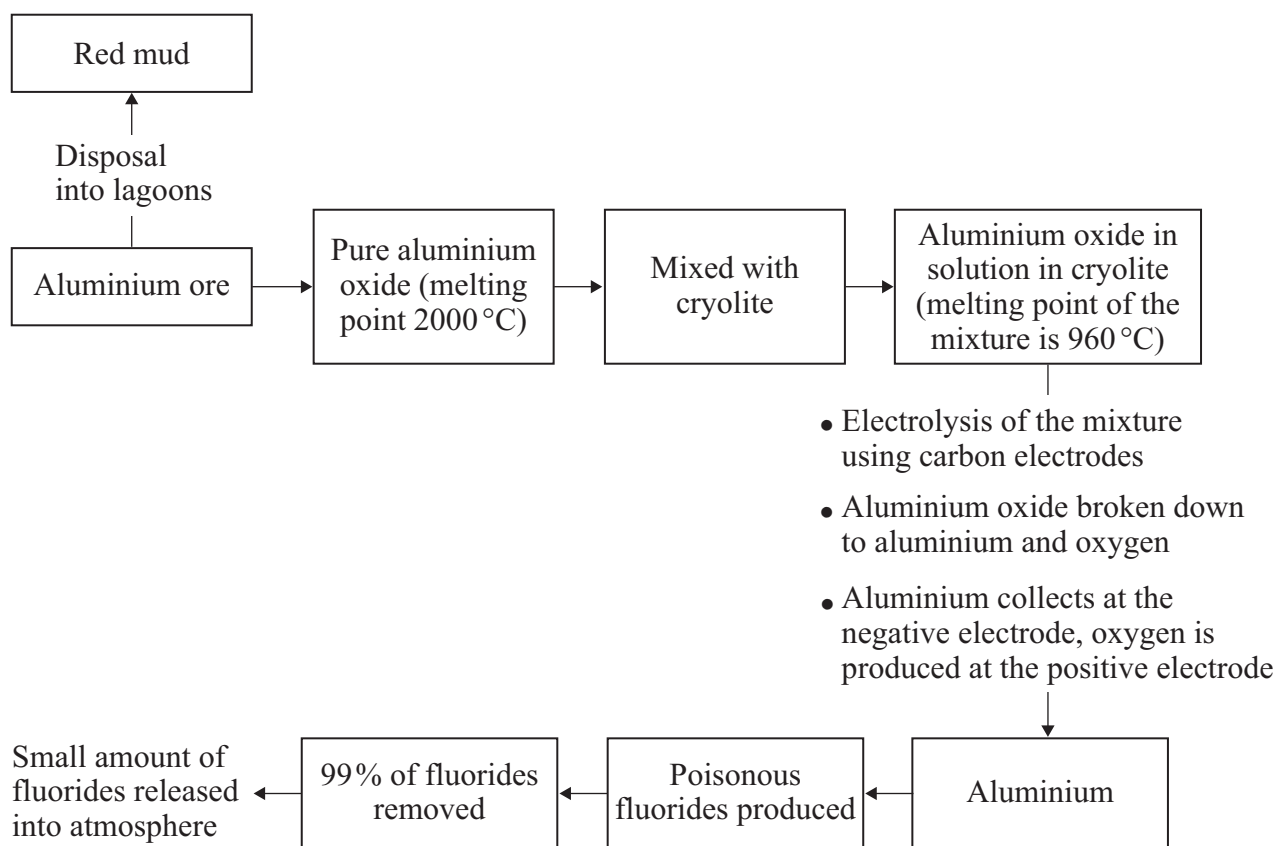
This is because . . .

- 1 micrograms per litre is a larger unit than tonnes.
  - 2 people inhale fumes from petrol every day, so it accumulates.
  - 3 the units are different and the scale for the  $y$ -axis for concentration in human blood creates a higher line.
  - 4 the efficiency of the engine has been reduced, increasing the petrol consumption.
- 8D** Which row in the table shows an advantage and a disadvantage of using unleaded petrol?

	<b>Advantage</b>	<b>Disadvantage</b>
<b>1</b>	Less lead released into the air	A replacement additive was needed and it cost a lot to develop
<b>2</b>	Cars will travel shorter distances	Lead will not be used as much
<b>3</b>	Lead levels in human blood will decrease	Companies will lose money removing lead from petrol
<b>4</b>	Less money will be spent on removing lead from petrol	Companies will need to store the lead removed from petrol

## QUESTION NINE

The flow chart shows the stages in the extraction of aluminium.



**9A** The red mud from the aluminium ore is disposed of by dumping in lagoons. The red mud contains iron oxide.

The most likely reason why iron is **not** extracted from the red mud is that . . .

- 1 the iron oxide evaporates too quickly.
- 2 there is no transportation system nearby.
- 3 it is **not** economic compared to other sources of iron.
- 4 iron oxide from the lagoons cannot be reduced by carbon.

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**9B** Why is pure aluminium oxide mixed with cryolite before electrolysis?

- 1 to produce an aluminium alloy
- 2 to reduce the breakdown of aluminium oxide
- 3 to lower the melting point so less energy is used during electrolysis
- 4 to react with impurities in the aluminium oxide

**9C** During electrolysis, the positive carbon electrode is rapidly used up causing emissions.

The main component of these emissions contributes to . . .

- 1 global dimming.
- 2 global warming.
- 3 acid rain.
- 4 red mud lagoons.

**9D** It is important to monitor the amount of poisonous fluorides released into the atmosphere.

Plants absorb these fluorides. The amounts of fluorides in plants can be found by chemical analysis.

The best information would be found by chemical analysis of plants that are growing . . .

- 1 in all the workers' homes.
- 2 at exactly one kilometre in all directions from the factory.
- 3 at various distances in all directions from the factory.
- 4 at various distances in an easterly direction from the factory.

**END OF TEST**

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