

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education  
Spring 2005



**SCIENCE: DOUBLE AWARD A (MODULAR) 346006**  
**CHEMISTRY A (MODULAR)**  
**Earth Materials (Module 06)**

Wednesday 2 March 2005 Morning Session

**In addition to this paper you will require:**

- a black ball-point pen;
- an 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 “Earth Materials” 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. Rough work may be done on the question paper.

**Instructions for recording answers**

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

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

1	2	3	4
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 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
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

- 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
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

**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 13 of this booklet.

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**FOUNDATION TIER**

**SECTION A**

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

In these questions match the words in the list with the numbers.

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

Mark your choices on the answer sheet.

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**QUESTION ONE**

This question is about limestone.

Match words from the list with the spaces **1–4** in the sentences.

**calcium carbonate**

**calcium hydroxide**

**calcium oxide**

**carbon dioxide**

Limestone is a rock containing mainly . . . . . **1** . . . . .

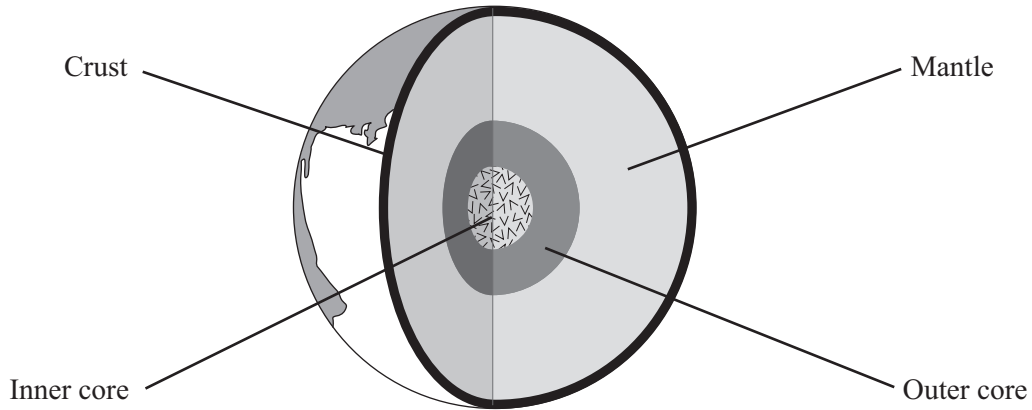
Limestone can be heated in a kiln to make quicklime, which is also called . . . . . **2** . . . . .

In this process . . . . . **3** . . . . . is also produced.

Quicklime reacts with water to produce . . . . . **4** . . . . .

**QUESTION TWO**

The diagram represents the structure of the Earth.



Match words from the list with the spaces **1–4** in the sentences.

**liquid**

**metal**

**rock**

**solid**

The solid crust is made up of different types of . . . . . **1** . . . . .

The core is made up of two different types of . . . . . **2** . . . . .

The outer core is liquid and the inner core is . . . . . **3** . . . . .

The mantle has some properties of a . . . . . **4** . . . . . because it can flow.

**Turn over ►**

**QUESTION THREE**

This question is about gases in the atmospheres of planets Earth and Venus.

Match words from the list with the numbers 1–4 in the table.

**carbon dioxide**

**methane**

**nitrogen**

**oxygen**

<b>Gas</b>	<b>What we can say about the gas</b>
<b>1</b>	it is the main gas in the atmosphere of Venus
<b>2</b>	it makes up about 20% of Earth's atmosphere
<b>3</b>	it makes up about 80% of Earth's atmosphere
<b>4</b>	it was present in the Earth's early atmosphere in small amounts and later reacted with oxygen

**QUESTION FOUR**

This question is about how we use some substances.

Match words from the list with the numbers 1–4 in the table.

**clay**

**poly(ethene)**

**poly(propene)**

**sodium carbonate**

<b>Substance</b>	<b>What we use it for</b>
<b>1</b>	to make cement
<b>2</b>	to make glass
<b>3</b>	to make plastic bags and plastic bottles
<b>4</b>	to make ropes and crates

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION FIVE**

This question is about processes that change things.

Match words from the list with the numbers 1–4 in the table.

**combining**

**condensing**

**cracking**

**neutralising**

<b>Process</b>	<b>Example of the process</b>
<b>1</b>	breaking down the alkane, decane ( $C_{10}H_{22}$ ), to form octane ( $C_8H_{18}$ ) and ethene ( $C_2H_4$ )
<b>2</b>	forming the oceans on Earth from water (vapour) in the atmosphere
<b>3</b>	reacting together hydrogen and oxygen to form water (vapour)
<b>4</b>	using slaked lime to reduce acidity in soils

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**SECTION B**Questions **SIX** and **SEVEN**.In these questions choose the best **two** answers.Do **not** choose more than two.Mark your choices on the answer sheet.

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**QUESTION SIX**

This question is about tectonic plates.

Which **two** of these statements are true?**tectonic plates are all gradually shrinking****tectonic plates are made only of sedimentary rocks****tectonic plates move because of convection currents****tectonic plates move slowly****tectonic plate movement is caused by earthquakes****QUESTION SEVEN**

This question is about plastics.

Which **two** of these statements are true?**most plastics are biodegradable****most plastics resist breakdown by microorganisms****plastics are made when large molecules are broken down****plastics are produced by fractional distillation of crude oil****poly(ethene) is a plastic****TURN OVER FOR THE NEXT QUESTION****Turn over ►**

**SECTION C**Questions **EIGHT** to **TEN**.

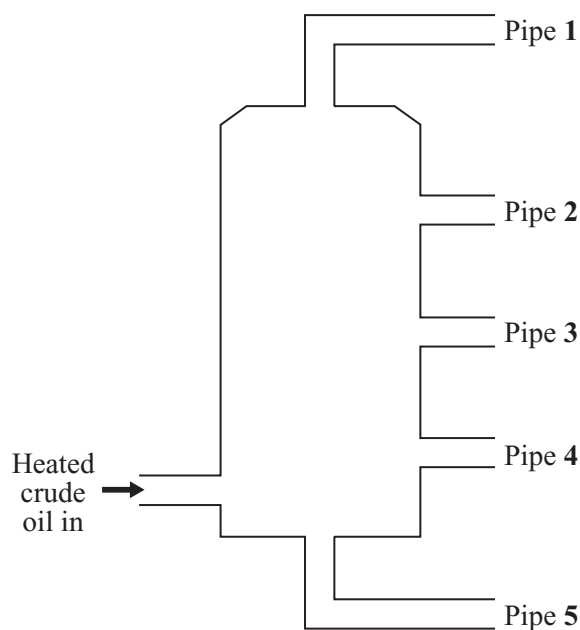
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

**QUESTION EIGHT**

Fractional distillation is used to separate crude oil into fractions.

**8.1** Crude oil is . . . . .

- A a compound of hydrocarbon atoms.
- B a compound of hydrocarbon molecules.
- C a mixture of hydrocarbon atoms.
- D a mixture of hydrocarbon molecules.

**8.2** Which physical change occurs to crude oil vapour during this fractional distillation?

- A Condensation
- B Evaporation
- C Freezing
- D Melting



- 8.3** From which pipe would you obtain the most volatile fraction?  
From which pipe would you obtain the most viscous fraction?

	<b>Most volatile</b>	<b>Most viscous</b>
<b>A</b>	Pipe 1	Pipe 1
<b>B</b>	Pipe 1	Pipe 5
<b>C</b>	Pipe 5	Pipe 1
<b>D</b>	Pipe 5	Pipe 5

- 8.4** From which pipe would you obtain the fraction with the highest boiling point?  
From which pipe would you obtain the fraction which could be most easily ignited?

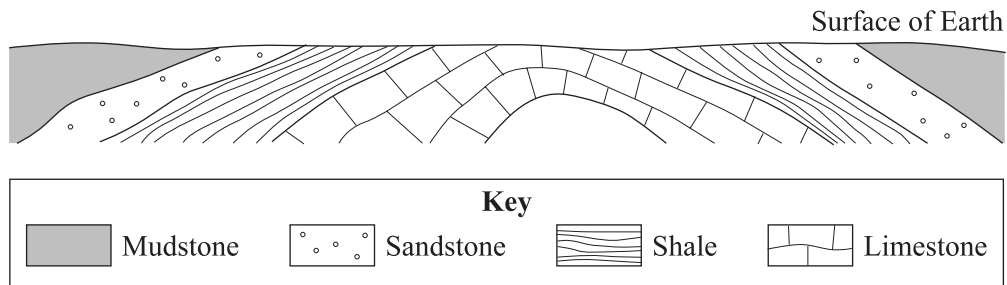
	<b>Highest boiling point</b>	<b>Most easily ignited</b>
<b>A</b>	Pipe 1	Pipe 1
<b>B</b>	Pipe 1	Pipe 5
<b>C</b>	Pipe 5	Pipe 1
<b>D</b>	Pipe 5	Pipe 5

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION NINE**

The diagram shows the arrangement of a series of rocks in the Earth's crust.



**9.1** The rocks were laid down in horizontal layers.

Over millions of years they have been . . . . .

- A faulted.
- B folded.
- C fractured.
- D turned upside down.

**9.2** The rocks have been affected by . . . . .

- A expansion of the crust.
- B large forces in the Earth's crust.
- C shrinking of the crust.
- D upward movement of the volcanic limestone.

**9.3** In what order were the rocks formed?

	<b>First formed</b>		<b>Last formed</b>	
<b>A</b>	limestone	shale	sandstone	mudstone
<b>B</b>	mudstone	sandstone	shale	limestone
<b>C</b>	sandstone	shale	limestone	mudstone
<b>D</b>	shale	sandstone	mudstone	limestone

**9.4** A geologist suggested that the sandstone was deposited by waves along the edge of a shallow lake.

What evidence for this might the sandstone contain?

- A** Fossils
- B** Layering
- C** Ripple marks
- D** Sand grains

**TURN OVER FOR THE NEXT QUESTION**

**QUESTION TEN**

This question is about burning fuels.

**10.1** Many fuels contain hydrocarbons.

Hydrocarbons are . . . . .

- A compounds.
- B elements.
- C mixtures.
- D oxides.

**10.2** Which word equation shows what happens when a pure hydrocarbon burns?

- A hydrocarbon + carbon dioxide → oxygen + water
- B hydrocarbon + oxygen → carbon dioxide + water
- C hydrocarbon + oxygen → hydrogen + carbon dioxide
- D hydrocarbon + oxygen → sulphur dioxide + water

**10.3** When crude oil burns, the three main products are carbon dioxide, water and sulphur dioxide.

These three substances are all . . . . .

- A carbonates.
- B hydroxides.
- C oxides.
- D sulphates.

**10.4** The Earth's early atmosphere contained carbon dioxide.

Much of the carbon from this carbon dioxide gradually became locked up in . . . . .

- A fossil fuels and carbonates.
- B metamorphic rocks.
- C poly(ethene).
- D water (vapour).

**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 A**

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

In these questions match the words in the list with the numbers.

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

Mark your choices on the answer sheet.

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**QUESTION ONE**

This question is about processes that change things.

Match words from the list with the numbers **1–4** in the table.

**combining**

**condensing**

**cracking**

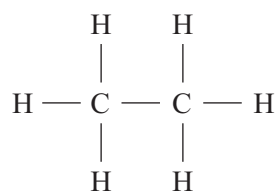
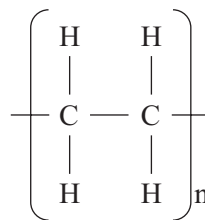
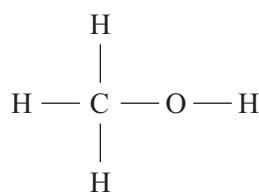
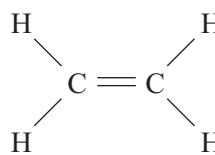
**neutralising**

<b>Process</b>	<b>Example of the process</b>
<b>1</b>	breaking down the alkane, decane ( $C_{10}H_{22}$ ), to form octane ( $C_8H_{18}$ ) and ethene ( $C_2H_4$ )
<b>2</b>	forming the oceans on Earth from water (vapour) in the atmosphere
<b>3</b>	reacting together hydrogen and oxygen to form water (vapour)
<b>4</b>	using slaked lime to reduce acidity in soils

Turn over ►

## QUESTION TWO

The diagrams below show the structural formulae of four organic compounds.

**J****K****L****M**

Match each compound with the descriptions 1–4 in the table.

Organic compound	Description
<b>1</b>	it is a hydrocarbon which turns bromine water colourless
<b>2</b>	it is a polymer
<b>3</b>	it is a saturated hydrocarbon with a low melting point
<b>4</b>	it is <b>not</b> a hydrocarbon

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**SECTION B**Questions **THREE** and **FOUR**.In these questions choose the best **two** answers.Do **not** choose more than two.Mark your choices on the answer sheet.

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**QUESTION THREE**

This question is about plastics.

Which **two** of these statements are true?**most plastics are biodegradable****most plastics resist breakdown by microorganisms****plastics are made when large molecules are broken down****plastics are produced by fractional distillation of crude oil****poly(ethene) is a plastic****QUESTION FOUR**

This question is about ethene.

Which **two** of the following statements are true?**ethene burns to produce carbon dioxide and hydrogen****ethene is an alkane****ethene is an unsaturated hydrocarbon****ethene molecules combine to produce the polymer, poly(propene)****ethene molecules have a carbon carbon double bond****TURN OVER FOR THE NEXT QUESTION****Turn over ►**

**SECTION C**Questions **FIVE** to **TEN**.

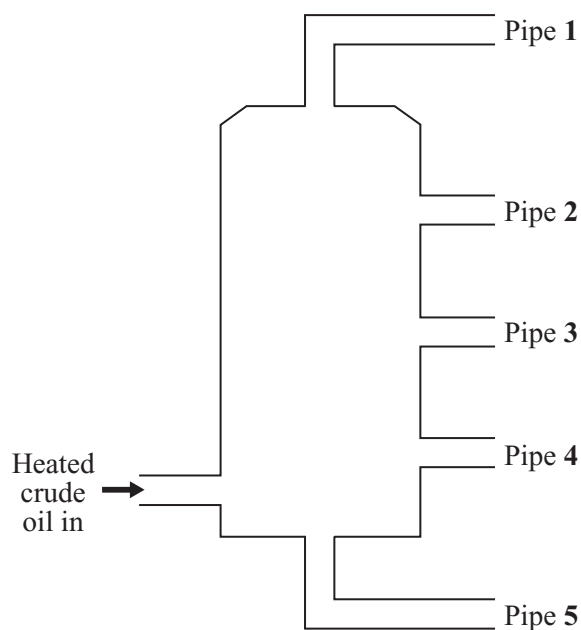
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

**QUESTION FIVE**

Fractional distillation is used to separate crude oil into fractions.

**5.1** Crude oil is . . . . .

- A a compound of hydrocarbon atoms.
- B a compound of hydrocarbon molecules.
- C a mixture of hydrocarbon atoms.
- D a mixture of hydrocarbon molecules.

**5.2** Which physical change occurs to crude oil vapour during this fractional distillation?

- A Condensation
- B Evaporation
- C Freezing
- D Melting



- 5.3** From which pipe would you obtain the most volatile fraction?  
From which pipe would you obtain the most viscous fraction?

	<b>Most volatile</b>	<b>Most viscous</b>
<b>A</b>	Pipe 1	Pipe 1
<b>B</b>	Pipe 1	Pipe 5
<b>C</b>	Pipe 5	Pipe 1
<b>D</b>	Pipe 5	Pipe 5

- 5.4** From which pipe would you obtain the fraction with the highest boiling point?  
From which pipe would you obtain the fraction which could be most easily ignited?

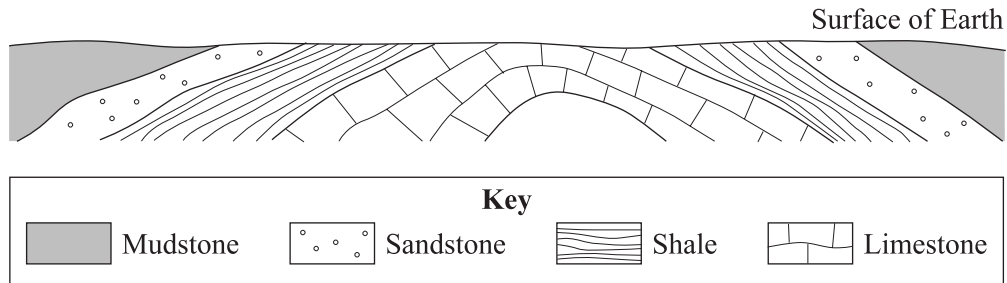
	<b>Highest boiling point</b>	<b>Most easily ignited</b>
<b>A</b>	Pipe 1	Pipe 1
<b>B</b>	Pipe 1	Pipe 5
<b>C</b>	Pipe 5	Pipe 1
<b>D</b>	Pipe 5	Pipe 5

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION SIX**

The diagram shows the arrangement of a series of rocks in the Earth's crust.



**6.1** The rocks were laid down in horizontal layers.

Over millions of years they have been . . . . .

- A faulted.
- B folded.
- C fractured.
- D turned upside down.

**6.2** The rocks have been affected by . . . . .

- A expansion of the crust.
- B large forces in the Earth's crust.
- C shrinking of the crust.
- D upward movement of the volcanic limestone.

6.3 In what order were the rocks formed?

	<b>First formed</b>		<b>Last formed</b>	
<b>A</b>	limestone	shale	sandstone	mudstone
<b>B</b>	mudstone	sandstone	shale	limestone
<b>C</b>	sandstone	shale	limestone	mudstone
<b>D</b>	shale	sandstone	mudstone	limestone

6.4 A geologist suggested that the sandstone was deposited by waves along the edge of a shallow lake.

What evidence for this might the sandstone contain?

- A** Fossils
- B** Layering
- C** Ripple marks
- D** Sand grains

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION SEVEN**

This question is about burning fuels.

**7.1** Many fuels contain hydrocarbons.

Hydrocarbons are . . . . .

- A compounds.
- B elements.
- C mixtures.
- D oxides.

**7.2** Which word equation shows what happens when a pure hydrocarbon burns?

- A hydrocarbon + carbon dioxide → oxygen + water
- B hydrocarbon + oxygen → carbon dioxide + water
- C hydrocarbon + oxygen → hydrogen + carbon dioxide
- D hydrocarbon + oxygen → sulphur dioxide + water

**7.3** When crude oil burns, the three main products are carbon dioxide, water and sulphur dioxide.

These three substances are all . . . . .

- A carbonates.
- B hydroxides.
- C oxides.
- D sulphates.

**7.4** The Earth's early atmosphere contained carbon dioxide.

Much of the carbon from this carbon dioxide gradually became locked up in . . . . .

- A fossil fuels and carbonates.
- B metamorphic rocks.
- C poly(ethene).
- D water (vapour).

**QUESTION EIGHT**

The Earth's crust is unstable and it is continually changing. Changes are produced in various ways.

- 8.1** Earthquakes occur along the Californian coast . . . . .
- A** along an oceanic ridge.
  - B** where tectonic plates move away from each other.
  - C** where tectonic plates slide past each other.
  - D** where there is sea floor spreading.
- 8.2** New oceanic crust is formed . . . . .
- A** when a continental plate rises above an oceanic plate.
  - B** when an oceanic plate rises above a continental plate.
  - C** when tectonic plates move away from each other.
  - D** when tectonic plates move towards each other.
- 8.3** New continental mountain ranges form . . . . .
- A** along oceanic ridges.
  - B** where tectonic plates move away from each other.
  - C** where tectonic plates move towards each other.
  - D** where tectonic plates slide past each other.
- 8.4** Volcanoes are produced . . . . .
- A** by convection currents in the Earth's core.
  - B** by magma rising through the Earth's crust.
  - C** by periodic reversals of the Earth's magnetic field.
  - D** by shrinking of the Earth's crust.

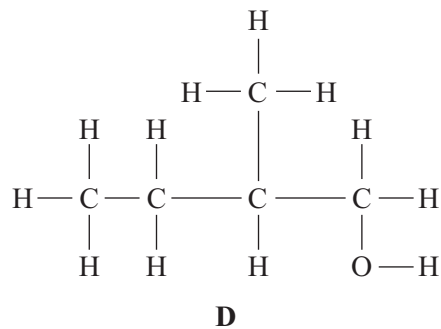
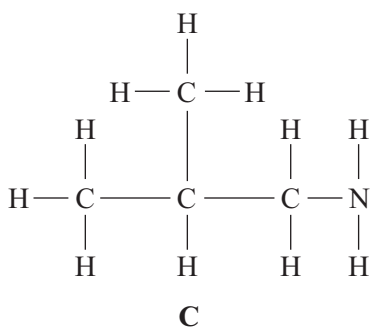
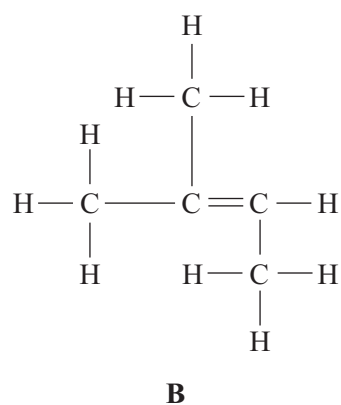
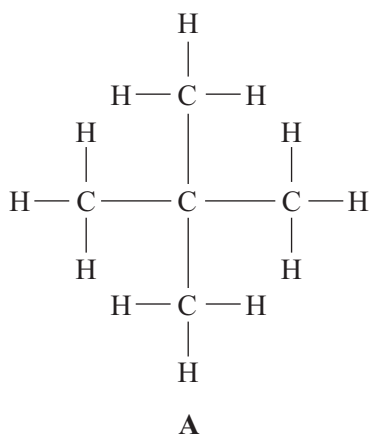
Turn over ►

**QUESTION NINE**

This question is about substances called saturated hydrocarbons.

- 9.1** Saturated hydrocarbons are known as . . . . .
- A** addition polymers.
  - B** alkanes.
  - C** alkenes.
  - D** monomers.
- 9.2** Saturated hydrocarbons usually contain . . . . .
- A** double, covalent carbon carbon bonds.
  - B** double, ionic carbon carbon bonds.
  - C** single, covalent carbon carbon bonds.
  - D** single, ionic carbon carbon bonds.
- 9.3** Which of the following could be a saturated hydrocarbon?
- A** A substance that can form addition polymers
  - B** A substance that can turn bromine water colourless
  - C** A substance with the formula  $C_4H_8$
  - D** An unreactive hydrocarbon

9.4 Which of the following structural formulae represents a saturated hydrocarbon?



TURN OVER FOR THE NEXT QUESTION

Turn over ►

**QUESTION TEN**

This question is about the way the Earth's atmosphere has changed.

The Earth's early atmosphere was very similar to the atmosphere of Mars today.

**10.1** What were the amounts of nitrogen, oxygen and carbon dioxide in Earth's early atmosphere?

	<b>Nitrogen</b>	<b>Oxygen</b>	<b>Carbon dioxide</b>
<b>A</b>	40%	40%	20%
<b>B</b>	20%	80%	little/none
<b>C</b>	little/none	little/none	very high
<b>D</b>	little/none	50%	50%

**10.2** What changes occurred to the atmosphere over the next few hundred million years?

	<b>Nitrogen</b>	<b>Oxygen</b>	<b>Carbon dioxide</b>
<b>A</b>	increased	increased	decreased
<b>B</b>	decreased	decreased	stayed the same
<b>C</b>	stayed the same	increased	decreased
<b>D</b>	increased	decreased	increased

**10.3** One process which releases carbon dioxide into the atmosphere is . . . . .

- A** the cutting down of rainforest trees.
- B** the decomposition of carbonate rocks deep inside the earth.
- C** the decomposition of sand.
- D** the formation of fossil fuels.

**10.4** One way in which carbon dioxide is removed from the atmosphere is by . . . . .

- A** the activity of animals.
- B** the burning of fossil fuels.
- C** the reaction of carbon dioxide with sea water.
- D** the eruption of volcanoes.

**END OF TEST**