

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
Winter 2004



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

346006

Thursday 18 November 2004 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.

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 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.

QUESTION ONE

This question is about gases.

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

carbon dioxide

nitrogen

oxygen

sulphur dioxide

Gas	What we can say about the gas
1	it is released into the atmosphere when impurities in fuels are burnt
2	it is the main gas in the atmosphere of Venus
3	it makes up about 20% of Earth's present atmosphere
4	it makes up about 80% of Earth's present atmosphere

QUESTION TWO

This question is about processes that change things.

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

burning

condensation

deposition

neutralisation

Process	Example of the process
1	a fuel reacting with oxygen to release thermal (heat) energy
2	limestone reacting with lake water to make it less acid
3	particles of sand and mud falling onto the sea bed to form a sediment
4	water vapour changing to form liquid water

QUESTION THREE

This question is about hydrocarbons.

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

compound

element

mixture

molecule

Crude oil is a **1** made up mainly of hydrocarbons.

A hydrocarbon is a **2** of carbon and hydrogen only.

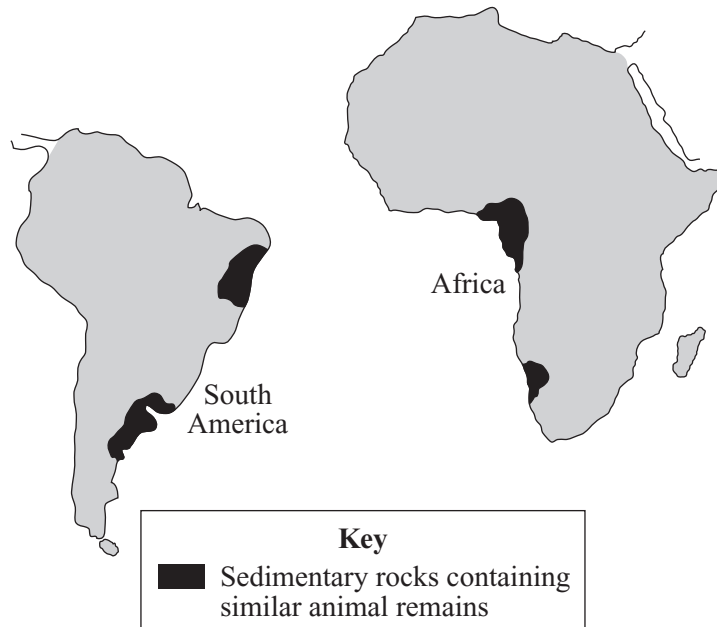
The larger a hydrocarbon **3** is, the more carbon atoms it will contain.

Crude oil may also contain the **4** sulphur as an impurity.

Turn over ►

QUESTION FOUR

This question is about the evidence for continental drift.



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

fossils

plates

rocks

shapes

You can see that South America and Africa have matching **1** , which suggests that they once fitted closely together.

Some sedimentary rocks on facing coasts contain similar animal remains we call **2**

There are also similar patterns of sedimentary and metamorphic **3** on the two continents.

This suggests that the tectonic **4** on which South America and Africa lie, have moved apart.

QUESTION FIVE

The flow diagram shows how some chemical substances are made from limestone.

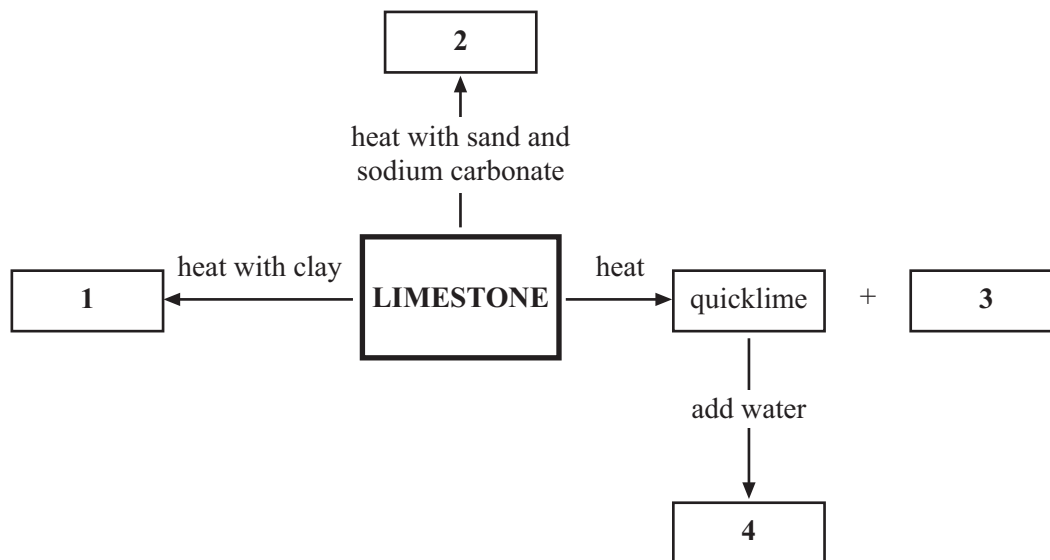
Match words from the list with the labels 1–4 on the diagram.

carbon dioxide

cement

glass

slaked lime



TURN OVER FOR THE NEXT QUESTION

Turn over ►

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

QUESTION SIX

This question is about the layers of the Earth.

Which **two** of the following statements are correct?**convection currents occur within the mantle****the crust consists entirely of sedimentary rocks****the inner core is gaseous****the mantle is composed of the metals nickel and iron****the outer core is liquid****QUESTION SEVEN**

This question is about mixtures.

Which **two** of the following are mixtures?**air****calcium carbonate****concrete****ethene****quicklime**

NO QUESTIONS APPEAR ON THIS PAGE

TURN OVER FOR THE NEXT QUESTION

Turn over ►

SECTION CQuestions **EIGHT** to **TEN**.

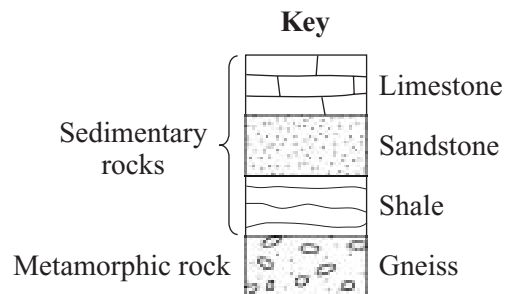
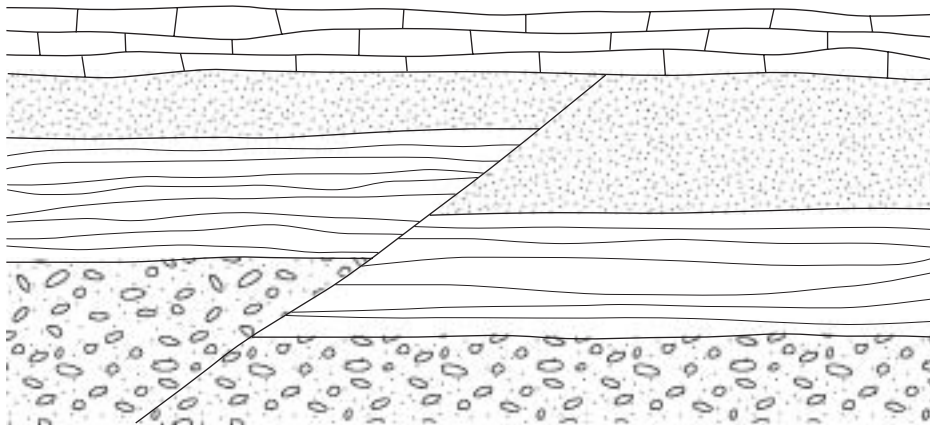
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION EIGHT

The diagram shows the sequence of rocks in one part of the Earth's crust.



8.1 The rock which formed under high pressure and temperature conditions is

- A gneiss.
- B limestone.
- C sandstone.
- D shale.

8.2 Which of the following statements is most likely to be correct?

- A The gneiss is the youngest rock
- B The limestone is younger than the shale
- C The sandstone and shale are the same age
- D The sandstone is older than the shale

8.3 When were the rocks faulted?

- A After deposition of the limestone
- B Before deposition of the limestone
- C Before formation of the shale
- D During deposition of the sandstone

8.4 What causes rocks to be faulted in this way?

- A Earthquakes
- B Large forces within the Earth's crust
- C Quarrying
- D Shrinking of the Earth's crust

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION NINE

Some large hydrocarbon molecules are broken down (cracked) to produce smaller molecules.

9.1 The process of cracking large hydrocarbon molecules is an example of

- A fractional distillation.
- B neutralisation.
- C polymerisation.
- D thermal decomposition.

9.2 In the cracking process

- A hot gases are mixed with water.
- B hot vapours are passed over a hot catalyst.
- C liquids are mixed with water.
- D liquids are passed over a catalyst.

9.3 The smaller molecules produced in the cracking process are usually.

- A equally as useful as the large, uncracked molecules.
- B less useful than the large, uncracked molecules.
- C more useful than the large, uncracked molecules.
- D of no use and are burned to get rid of them.

9.4 The different products of cracking can be used

- A for many purposes, including making poly(ethene) and as fuels.
- B only as fuels.
- C only to make poly(ethene).
- D only to make poly(propene).

NO QUESTIONS APPEAR ON THIS PAGE

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION TEN

This question is about the Earth.



- 10.1** The density of the Earth is 5.5 g/cm^3 .
Samples of rock taken from the Earth's crust have an average density of 2.8 g/cm^3 .

From these figures, we can say that

- A the Earth's core is made of iron and nickel.
 - B the rocks at the Earth's centre have a lower density than those in the crust.
 - C the rocks below the crust are in the liquid state.
 - D the rocks in the interior of the Earth have a higher density than those in the crust.
- 10.2** In 2002, there were some small earthquakes centred on Dudley in the West Midlands.

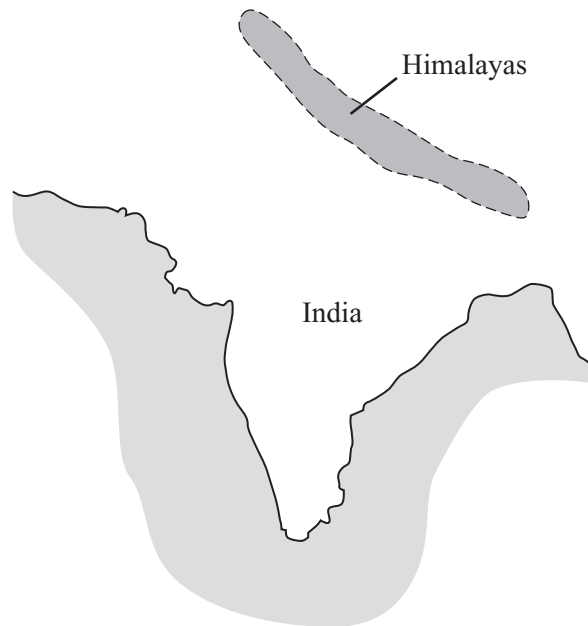
The likely cause of the earthquakes was

- A shrinking of the Earth's crust.
- B stresses caused by tectonic plate movement.
- C the collapse of old mine workings in the area.
- D volcanic activity in the nearby mountains.

10.3 Scientists once believed that mountains were formed

- A by the shrinking of the Earth's crust.
- B when crustal rocks melted.
- C when sedimentary rocks rose above more dense igneous rocks.
- D when the Earth's mantle expanded.

10.4 The Himalayas are a range of mountains to the north of India.



The Himalayas were formed

- A by expansion of the Earth's mantle.
- B by large-scale movements of the Earth's crust.
- C by volcanic eruptions.
- D by weathering and erosion of older mountain ranges.

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 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.

QUESTION ONE

The flow diagram shows how some chemical substances are made from limestone.

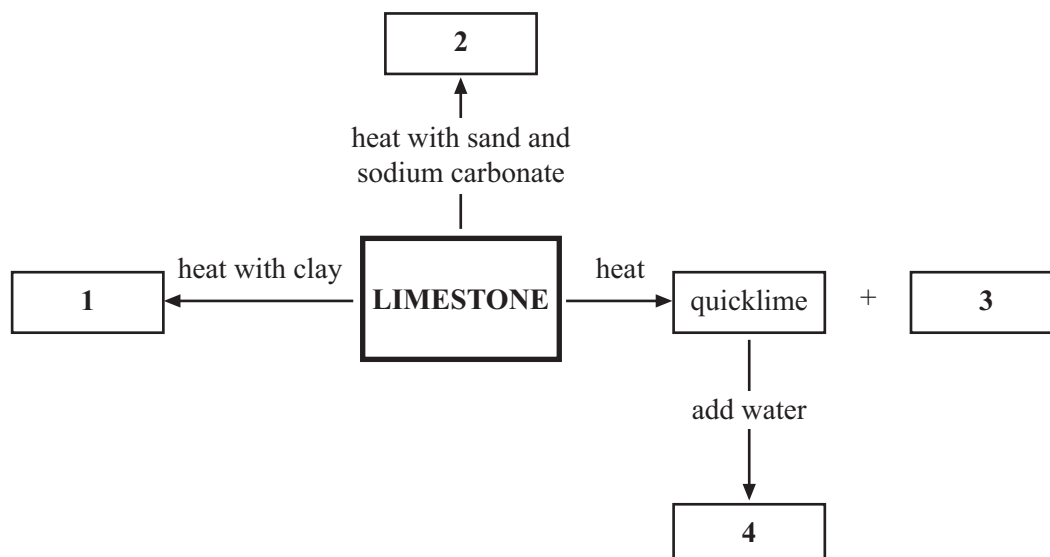
Match words from the list with the labels **1–4** on the diagram.

carbon dioxide

cement

glass

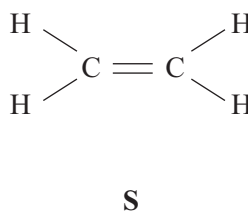
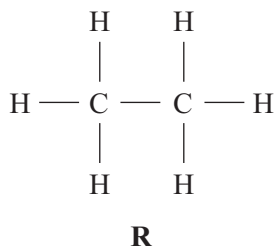
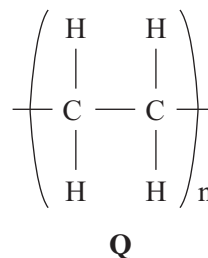
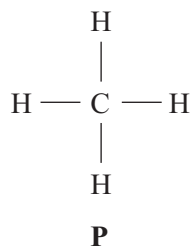
slaked lime



QUESTION TWO

This question is about the structures of hydrocarbon molecules.

Match the structures **P**, **Q**, **R** and **S** with the numbers **1–4** in the table.



Structure	Hydrocarbon molecule
1	an alkane with two carbon atoms
2	ethene, the simplest alkene
3	methane, the simplest alkane
4	the polymer, poly(ethene)

TURN OVER FOR THE NEXT QUESTION

Turn over ►

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

QUESTION THREE

This question is about mixtures.

Which **two** of the following are mixtures?**air****calcium carbonate****concrete****ethene****quicklime****QUESTION FOUR**Which **two** word equations are examples of thermal decomposition?**calcium carbonate** → **calcium oxide** + **carbon dioxide****calcium oxide** + **water** → **calcium hydroxide****decane (C₁₀H₂₂)** → **ethene** + **octane (C₈H₁₈)****ethane** + **oxygen** → **carbon dioxide** + **water****ethene** → **poly(ethene)**

NO QUESTIONS APPEAR ON THIS PAGE

TURN OVER FOR THE NEXT QUESTION

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SECTION CQuestions **FIVE** to **TEN**.

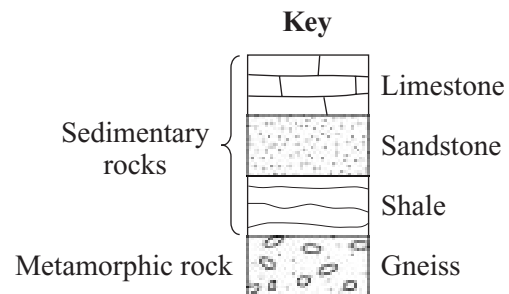
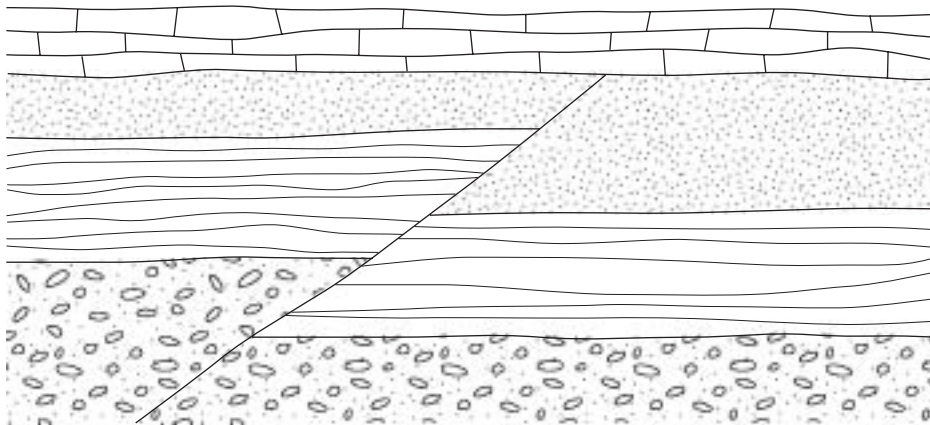
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QUESTION SEVEN

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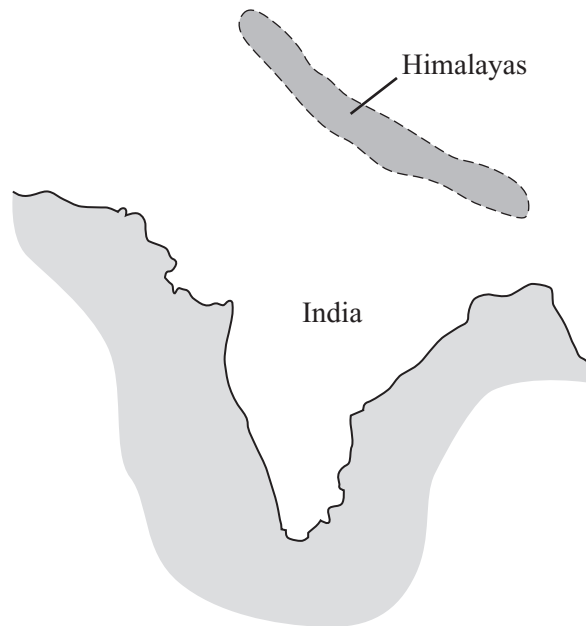
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 - D when the Earth's mantle expanded.
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The Himalayas were formed

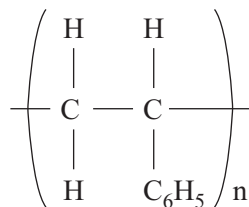
- A by expansion of the Earth's mantle.
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TURN OVER FOR THE NEXT QUESTION

Turn over ►

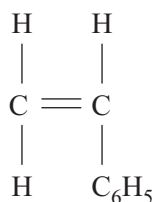
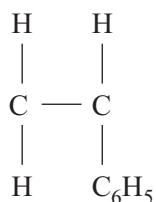
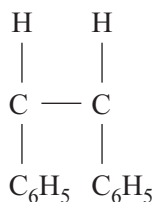
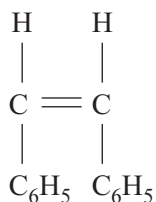
QUESTION EIGHT

The diagram represents a long chain molecule of a polymer called poly(styrene).



The molecules of poly(styrene) are built up from small molecules of styrene.

8.1 What is the formula for a molecule of styrene?

**A****B****C****D**

8.2 Each small molecule, from which the large poly(styrene) molecule is built up, is called

- A** an alkane.
- B** a fraction.
- C** a monomer.
- D** a polymer.

8.3 Molecules of styrene are able to join together to form long chain molecules because

- A they are hydrocarbons.
- B they are unsaturated.
- C they have carbon carbon bonds.
- D they have covalent bonds.

8.4 What other product is formed when styrene molecules combine to produce poly(styrene)?

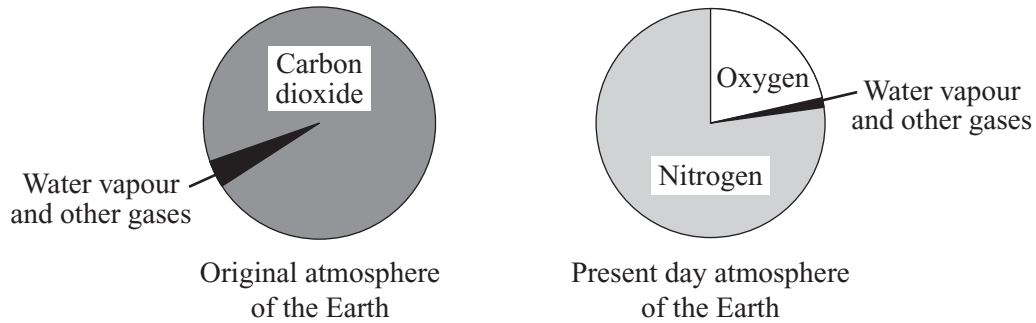
- A Carbon dioxide
- B Hydrogen
- C Water
- D No other product is formed

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION NINE

The composition of the Earth's atmosphere has changed since the Earth formed.



- 9.1** Which gas in the Earth's original atmosphere decreased by being locked up in fossil fuels and carbonate rocks?
- A Carbon dioxide
 - B Nitrogen
 - C Oxygen
 - D Water vapour
- 9.2** Which gas was added to the Earth's atmosphere by the activity of plants?
- A Carbon dioxide
 - B Nitrogen
 - C Oxygen
 - D Water vapour
- 9.3** Which pair of gases were both added to the Earth's original atmosphere by volcanic activity?
- A Carbon dioxide and water vapour
 - B Nitrogen and oxygen
 - C Oxygen and carbon dioxide
 - D Water vapour and nitrogen

9.4 Which gas was released into the Earth's atmosphere by the action of denitrifying bacteria?

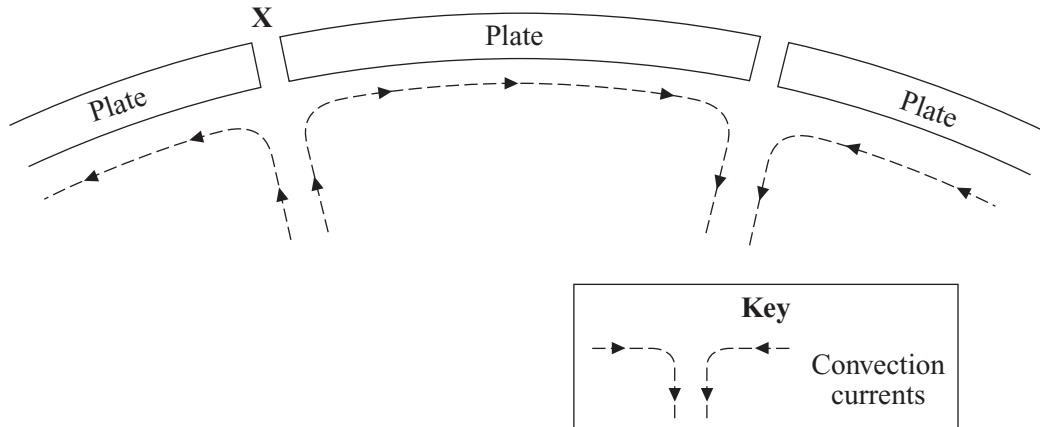
- A** Carbon dioxide
- B** Nitrogen
- C** Oxygen
- D** Water vapour

TURN OVER FOR THE NEXT QUESTION

Turn over ►

QUESTION TEN

The Earth's lithosphere is cracked into a number of tectonic plates.



10.1 The Earth's lithosphere is composed of the

- A crust and mantle.
- B crust and upper mantle.
- C upper and lower crust.
- D upper crust only.

10.2 At a plate boundary of the type shown at **X**

- A new continental mountains are forming.
- B new oceanic crust is forming.
- C oceanic crust is being destroyed.
- D the sea floor is shrinking.

10.3 At a plate boundary of the type shown at **X**

- A magma rises and solidifies as basaltic rock.
- B magma rises and solidifies as granitic rock.
- C one plate is driven below the other.
- D there are frequent earthquakes.

10.4 One region where there is a plate boundary of the type shown at **X** is

- A** along the coast of California.
- B** along the east coast of South America.
- C** along the mid-Atlantic ridge.
- D** along the west coast of Africa.

END OF TEST