

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education  
June 2003



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

**346006**

Tuesday 24 June 2003 Morning Session

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

- an HB pencil and a rubber;
- an answer sheet.

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.
- Answer **all** the questions for the Tier you are attempting.
- 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.
- Mark your responses on the separate answer sheet only. Rough work may be done on the question paper.
- Mark the best responses by using a thick pencil stroke to fill in the box. Use an HB pencil. Make sure the pencil stroke does **not** extend beyond the box. Do **not** use ink or ball-point pen. If you wish to change your answer, rub out your first answer completely. See below.

**Examples:**

	1	2	3	4
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	QUESTION XXX			
xxx.1	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
xxx.2	<input type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input checked="" type="checkbox"/> D
xxx.3	<input type="checkbox"/> A	<input checked="" type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D
xxx.4	<input checked="" type="checkbox"/> A	<input type="checkbox"/> B	<input type="checkbox"/> C	<input type="checkbox"/> D

**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 rub 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 11 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 hydrocarbon fuels.

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

**hydrogen**

**oxygen**

**sulphur**

**water**

Hydrocarbons are compounds of the elements carbon and . . . . . **1** . . . . .

One other element that is sometimes found in these fuels is . . . . . **2** . . . . .

When hydrocarbon fuels burn in air, carbon and . . . . . **3** . . . . . combine to form carbon dioxide.

Another oxide that is formed is . . . . . **4** . . . . .

## QUESTION TWO

This question is about crude oil.

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

**atoms**

**fractions**

**hydrocarbons**

**molecules**

Crude oil is a mixture that contains a large number of compounds called ..... **1** .....

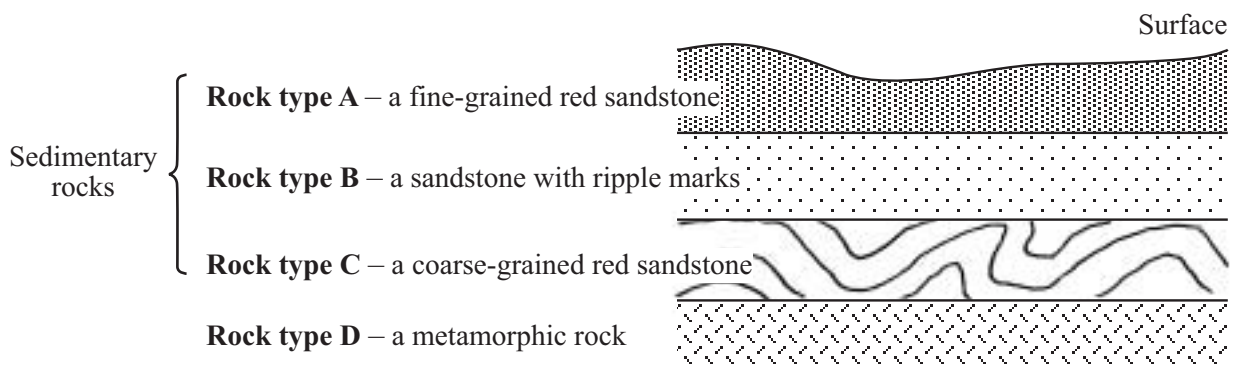
The crude oil is separated by fractional distillation into a number of parts called ..... **2** .....

In each of these parts, the compounds have ..... **3** ..... with similar numbers of carbon ..... **4** .....

## QUESTION THREE

This question is about rocks in the Earth's crust.

Match rock types from the list with each of the numbers 1–4 in the table.



Rock type	What we can say about the rock
<b>1</b>	it has been folded
<b>2</b>	it is probably the youngest rock
<b>3</b>	it was formed under high temperature and pressure
<b>4</b>	it was deposited under water

Turn over ►

### QUESTION FOUR

The diagram shows stages in making cement and concrete.

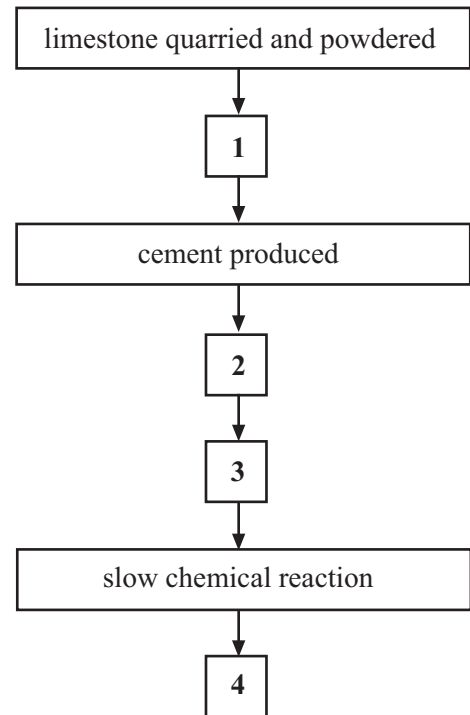
Match words from the list with each of the spaces 1–4, to describe what happens in this process.

**cement mixed with sand and crushed rock**

**concrete produced**

**limestone heated in a kiln with clay**

**water added to mixture**



### QUESTION FIVE

This question is about chemical and physical changes.

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

**burning**

**condensation**

**distillation**

**thermal decomposition**

Process	What happens in the process
1	a compound is split up into simpler substances by heating
2	a fuel reacts with oxygen, releasing thermal (heat) energy
3	a liquid is evaporated and then the vapour is cooled to make a purer liquid
4	a vapour cools and changes to a liquid

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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.

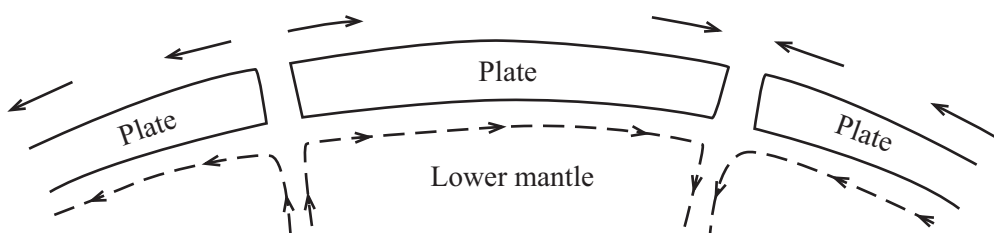
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**QUESTION SIX**

This question is about plastics (polymers).

Choose from the list the **two** statements that are correct.**plastics (polymers) are formed in cracking reactions****microorganisms break down waste polythene****most plastics (polymers) are not biodegradable****poly(ethene) is a plastic used for making plastic bags and bottles****plastics (polymers) have small molecules****QUESTION SEVEN**

This question is about tectonic plates.

Which **two** of these statements about tectonic plates are correct?**the plates are made up of the crust and upper mantle****the plates are in fixed positions****the plates move about 50 metres per year****the plates are moved by convection currents****the plates move as the Earth's crust shrinks****Turn over ►**

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**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.

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**QUESTION EIGHT****8.1** The word equation shows the reaction of calcium oxide with water.What is substance **X**?

- A** Calcium chloride
  - B** Calcium hydride
  - C** Calcium hydrogencarbonate
  - D** Calcium hydroxide
- 8.2** The common name for calcium oxide is . . . . .
- A** cement.
  - B** concrete.
  - C** glass.
  - D** quicklime.
- 8.3** Calcium oxide is manufactured by . . . . .
- A** heating limestone in a kiln.
  - B** the combination of calcium metal with oxygen.
  - C** the electrolysis of calcium carbonate.
  - D** the reduction of calcium hydroxide.

**8.4** Most plants grow best in neutral soil.

To which type of soil should a gardener add crushed limestone?

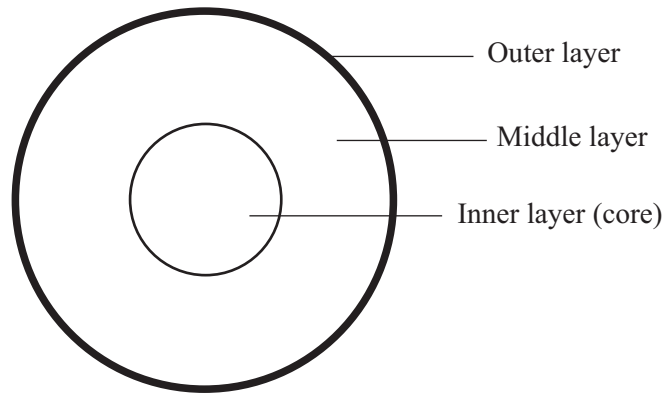
- A** Acid soil
- B** Alkaline soil
- C** Organic soil
- D** Sandy soil

**TURN OVER FOR THE NEXT QUESTION**

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**QUESTION NINE**

The diagram shows the three main layers of the Earth.



- 9.1** The middle layer is called the . . . . .
- A** crust.
  - B** lithosphere.
  - C** magma.
  - D** mantle.
- 9.2** The middle layer . . . . .
- A** has convection currents which move very slowly.
  - B** is made of solid rock which cannot flow.
  - C** is made up of metamorphic rocks.
  - D** is made up of sedimentary rocks.
- 9.3** The inner part of the inner layer (core) is . . . . .
- A** liquid and made from aluminium and silicon.
  - B** liquid and made from iron and nickel.
  - C** solid and made from aluminium and silicon.
  - D** solid and made from iron and nickel.



- 9.4** The mean (average) density of the rocks in the Earth's crust is 2.8 grams per cm<sup>3</sup>.  
The overall density of the Earth is 5.5 grams per cm<sup>3</sup>.

This suggests that . . . . .

- A** material in the Earth's interior is more dense than the crust.
- B** sedimentary rocks are more dense than metamorphic rocks.
- C** the density of rocks decreases with increased depth.
- D** the rocks of the crust are more dense than the material in the interior.

**TURN OVER FOR THE NEXT QUESTION**

**QUESTION TEN**

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

**10.1** The Earth's early atmosphere was similar to the atmosphere of Venus today.

The main gas forming this atmosphere was . . . . .

- A carbon dioxide.
- B nitrogen.
- C oxygen.
- D ozone.

**10.2** Most of the gas which formed this early atmosphere came from . . . . .

- A the activity of plants.
- B the condensation of water vapour.
- C the eruption of volcanoes.
- D the formation of fossil fuels.

**10.3** The other gases making up this early atmosphere were . . . . .

- A ammonia and carbon monoxide.
- B ammonia and chlorine.
- C ammonia, methane and water vapour.
- D argon, carbon monoxide and chlorine.

**10.4** The present-day atmosphere is made up mainly of . . . . .

- A carbon dioxide and nitrogen.
- B carbon dioxide and oxygen.
- C hydrogen and oxygen.
- D nitrogen and oxygen.

**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 chemical and physical changes.

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

**burning**

**condensation**

**distillation**

**thermal decomposition**

<b>Process</b>	<b>What happens in the process</b>
<b>1</b>	a compound is split up into simpler substances by heating
<b>2</b>	a fuel reacts with oxygen, releasing thermal (heat) energy
<b>3</b>	a liquid is evaporated and then the vapour is cooled to make a purer liquid
<b>4</b>	a vapour cools and changes to a liquid

**Turn over ►**

**QUESTION TWO**

This question is about gases that have been part of the Earth's atmosphere at some point since it was first formed.

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

**carbon dioxide**

**methane**

**nitrogen**

**ozone**

<b>Gas</b>	<b>What we can say about the gas</b>
<b>1</b>	it filters out ultraviolet radiation from the Sun
<b>2</b>	it was removed from the atmosphere when it reacted with oxygen
<b>3</b>	it is released into the atmosphere because of decomposition of carbonate rocks in the Earth's crust
<b>4</b>	it was released into the early atmosphere by the reaction between ammonia and oxygen

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**SECTION B**

Questions **THREE** and **FOUR**.

In these questions choose the best **two** answers.

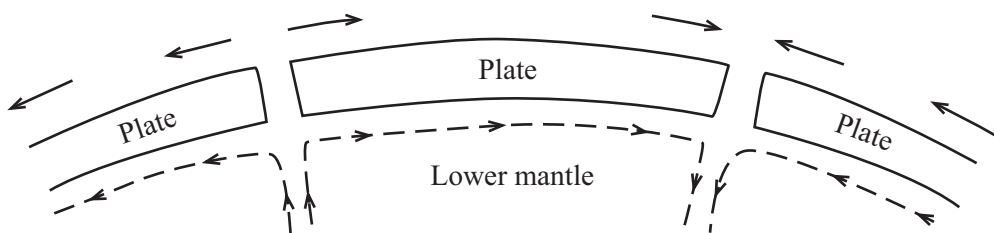
Do **not** choose more than two.

Mark your choices on the answer sheet.

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**QUESTION THREE**

This question is about tectonic plates.



Which **two** of these statements about tectonic plates are correct?

**the plates are made up of the crust and upper mantle**

**the plates are in fixed positions**

**the plates move about 50 metres per year**

**the plates are moved by convection currents**

**the plates move as the Earth's crust shrinks**

**QUESTION FOUR**

This question is about magnetic reversal patterns in the Earth's oceanic crust.

Which **two** statements about these patterns are correct?

**they are found where tectonic plates slide past each other**

**they give evidence of changes in the Earth's magnetic field**

**they give evidence of periodic volcanic eruptions**

**they indicate reversals in the direction of rotation of the Earth**

**they occur on each side of the mid-Atlantic ridge**

**Turn over ►**

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**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.

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**QUESTION FIVE****5.1** The word equation shows the reaction of calcium oxide with water.What is substance **X**?

- A** Calcium chloride
  - B** Calcium hydride
  - C** Calcium hydrogencarbonate
  - D** Calcium hydroxide
- 5.2** The common name for calcium oxide is . . . . .
- A** cement.
  - B** concrete.
  - C** glass.
  - D** quicklime.
- 5.3** Calcium oxide is manufactured by . . . . .
- A** heating limestone in a kiln.
  - B** the combination of calcium metal with oxygen.
  - C** the electrolysis of calcium carbonate.
  - D** the reduction of calcium hydroxide.

**5.4** Most plants grow best in neutral soil.

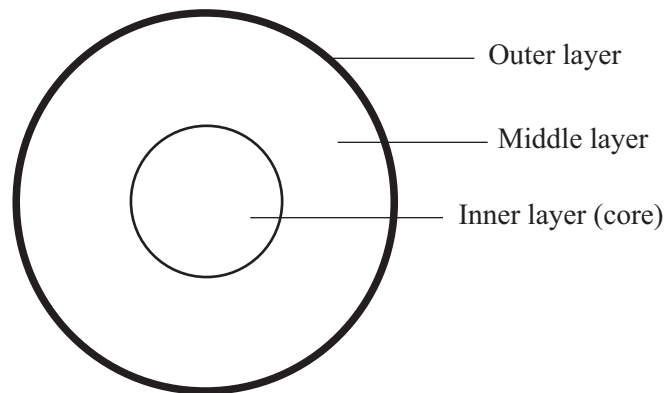
To which type of soil should a gardener add crushed limestone?

- A** Acid soil
- B** Alkaline soil
- C** Organic soil
- D** Sandy soil

**TURN OVER FOR THE NEXT QUESTION**

**QUESTION SIX**

The diagram shows the three main layers of the Earth.



- 6.1** The middle layer is called the . . . . .
- A** crust.
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  - D** mantle.
- 6.2** The middle layer . . . . .
- A** has convection currents which move very slowly.
  - B** is made of solid rock which cannot flow.
  - C** is made up of metamorphic rocks.
  - D** is made up of sedimentary rocks.
- 6.3** The inner part of the inner layer (core) is . . . . .
- A** liquid and made from aluminium and silicon.
  - B** liquid and made from iron and nickel.
  - C** solid and made from aluminium and silicon.
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- 6.4** The mean (average) density of the rocks in the Earth's crust is 2.8 grams per cm<sup>3</sup>.  
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This suggests that . . . . .

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**TURN OVER FOR THE NEXT QUESTION**

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**QUESTION SEVEN**

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

**7.1** The Earth's early atmosphere was similar to the atmosphere of Venus today.

The main gas forming this atmosphere was . . . . .

**A** carbon dioxide.

**B** nitrogen.

**C** oxygen.

**D** ozone.

**7.2** Most of the gas which formed this early atmosphere came from . . . . .

**A** the activity of plants.

**B** the condensation of water vapour.

**C** the eruption of volcanoes.

**D** the formation of fossil fuels.

**7.3** The other gases making up this early atmosphere were . . . . .

**A** ammonia and carbon monoxide.

**B** ammonia and chlorine.

**C** ammonia, methane and water vapour.

**D** argon, carbon monoxide and chlorine.

**7.4** The present-day atmosphere is made up mainly of . . . . .

**A** carbon dioxide and nitrogen.

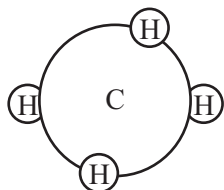
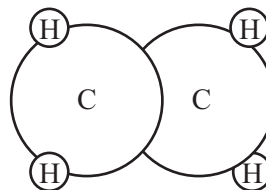
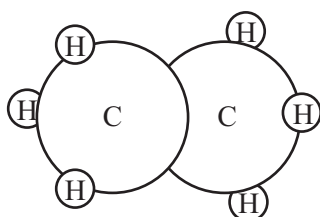
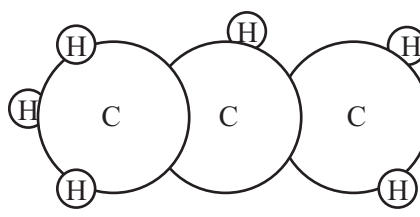
**B** carbon dioxide and oxygen.

**C** hydrogen and oxygen.

**D** nitrogen and oxygen.

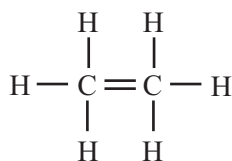
## QUESTION EIGHT

The diagrams represent four different hydrocarbon molecules.

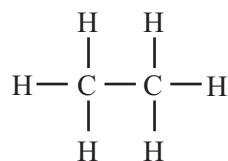
Molecule **W**Molecule **X**Molecule **Y**Molecule **Z**

8.1 The structural formula for hydrocarbon **Y** is . . . . .

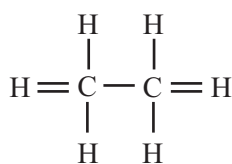
A



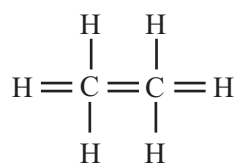
B



C



D



8.2 Which of the hydrocarbons belong to the alkene family?

- A Molecules **W** and **X**
- B Molecules **W** and **Y**
- C Molecules **X** and **Y**
- D Molecules **X** and **Z**

**8.3** What type of bond links the carbon atoms in molecule **X**?

- A** Covalent, double
- B** Covalent, single
- C** Ionic, double
- D** Ionic, single

**8.4** What effect will be seen if hydrocarbon **W** is bubbled into bromine water?

The bromine water . . . . .

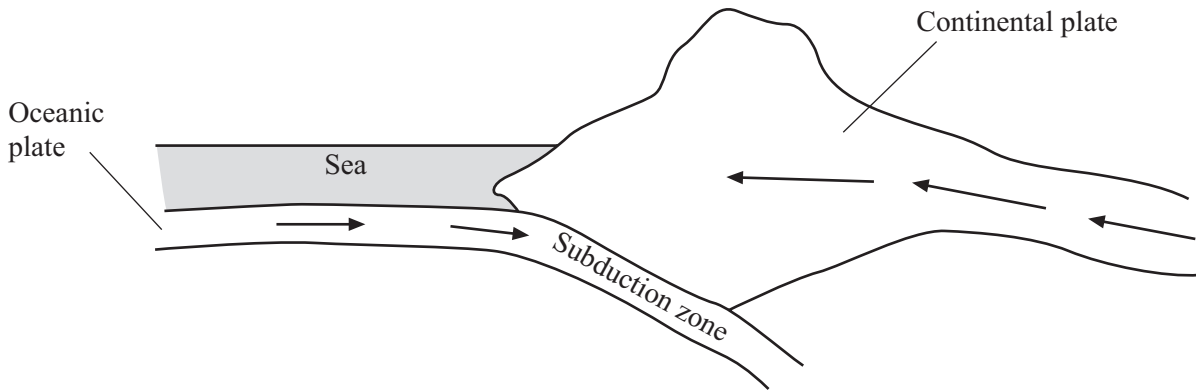
- A** becomes colourless.
- B** remains yellow-brown.
- C** turns from purple to red.
- D** turns from yellow-brown to green.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION NINE**

The diagram shows an oceanic plate and a continental plate moving towards each other.



- 9.1** As the plates move together . . . . .
- A** an oceanic ridge is formed.
  - B** magnetic reversal patterns are formed.
  - C** sea floor spreading takes place.
  - D** the oceanic plate is driven downwards.
- 9.2** What happens in the subduction zone?
- A** A large fault develops
  - B** A new sedimentary rock is formed
  - C** New continental crust is formed
  - D** The oceanic plate partially melts to form magma

**9.3** At the plate boundary, the continental plate is forced upwards to form . . . . .

- A** a mountain chain.
- B** an oceanic ridge.
- C** new basaltic crust.
- D** new oceanic crust.

**9.4** As the continental plate is forced upwards, the sediments in the plate . . . . .

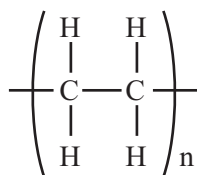
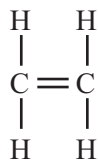
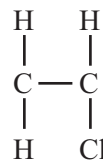
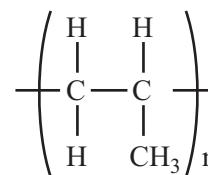
- A** are folded and metamorphosed.
- B** are melted.
- C** become less dense.
- D** form a basaltic magma.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

## QUESTION TEN

The diagrams show the structural formulae of the molecules of four compounds, **J**, **K**, **L** and **M**.

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

**10.1** Which of these are polymer molecules?

- A Molecule **K** only
- B Molecules **J** and **K**
- C Molecules **J** and **M**
- D Molecules **K** and **M**

**10.2** The monomers from which polymer molecules are formed are . . . . .

- A alkanes.
- B saturated.
- C unreactive.
- D unsaturated.

**10.3** Which of the molecules **J**, **K**, **L** or **M** is a monomer that could be polymerised?

- A Molecule **J**
- B Molecule **K**
- C Molecule **L**
- D Molecule **M**

**10.4** Polymers are made by polymerisation.

In addition polymerisation, the products are . . . . .

- A the polymer and carbon dioxide.
- B the polymer and hydrogen.
- C the polymer and water.
- D the polymer only.

**END OF TEST**