

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education  
March 2006

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

**346006**



Wednesday 8 March 2006 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

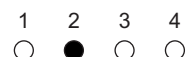
**Instructions**

- 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 '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.
- Do all rough work in this book, **not** on your answer sheet.

**Instructions for recording answers**

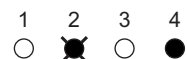
- Use a **black ball-point pen**.

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

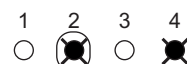


- Do **not** extend beyond the circles.

- 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 16 of this booklet.

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**FOUNDATION TIER**

**SECTION A**

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

In these questions match 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 gases.

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

**carbon dioxide (CO<sub>2</sub>)**

**methane (CH<sub>4</sub>)**

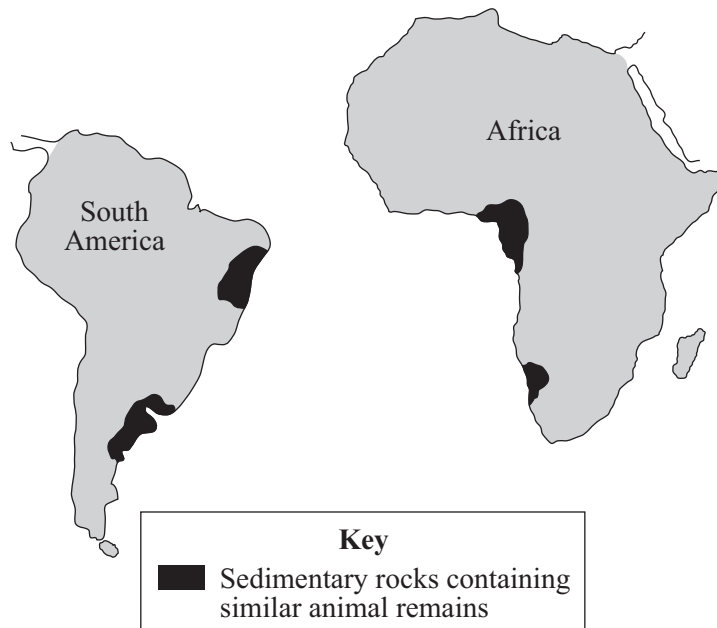
**oxygen (O<sub>2</sub>)**

**water vapour (H<sub>2</sub>O)**

<b>Gas</b>	<b>What we can say about the gas</b>
<b>1</b>	it combines with sulphur to form sulphur dioxide
<b>2</b>	it is a hydrocarbon gas
<b>3</b>	it is formed when carbon burns in air
<b>4</b>	it is formed when hydrogen burns in air

**QUESTION TWO**

This question is about the land masses of South America and Africa.



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

**fossils**

**plates**

**rocks**

**shapes**

Some sedimentary deposits on the east coast of South America and the west coast of Africa contain similar animal remains that we call . . . **1** . . . .

On these coasts there are also similar patterns of sedimentary . . . **2** . . . .

The two land masses have . . . **3** . . . which fit quite closely.

These pieces of evidence suggest that tectonic . . . **4** . . . have moved apart.

**Turn over ►**

**QUESTION THREE**

This question is about crude oil.

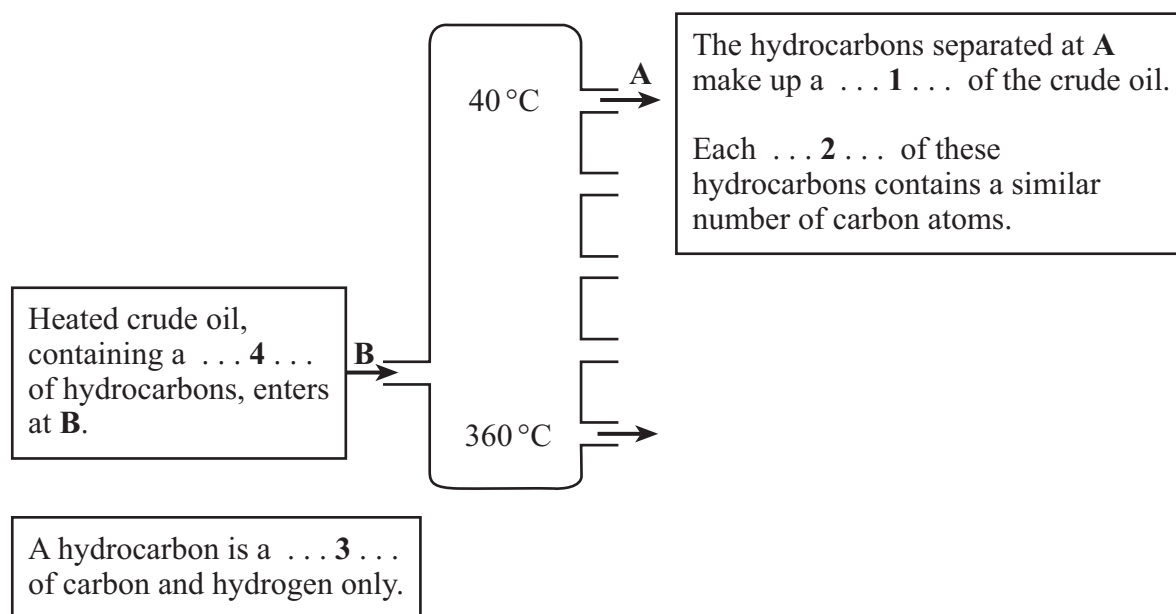
Match words from the list with the numbers 1–4 on the diagram.

**compound**

**fraction**

**mixture**

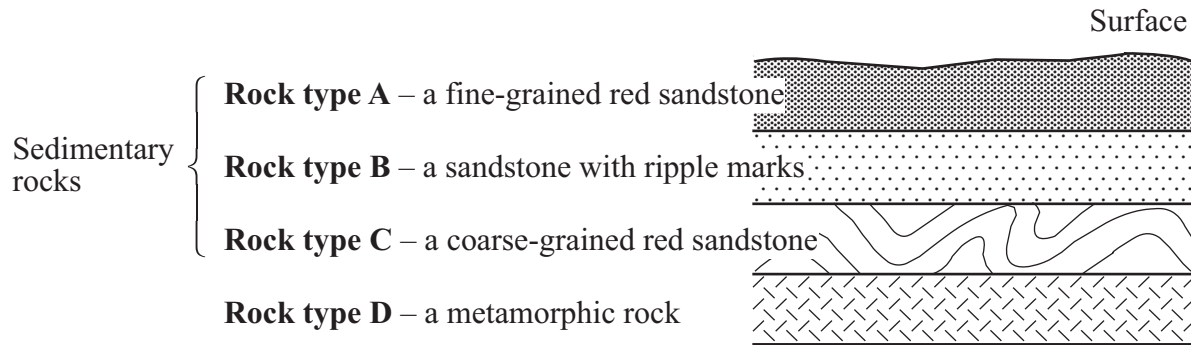
**molecule**



## QUESTION FOUR

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

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



Rock type	What we can say about the rock
1	it has been folded
2	it is probably the youngest rock
3	it shows evidence that it was formed by waves or currents
4	it was formed under high temperature and pressure

**Turn over for the next question**

**Turn over ►**

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**QUESTION FIVE**

This question is about processes that change things.

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

**biodegrade**

**combine**

**condense**

**neutralise**

<b>Process</b>	<b>Example of the process</b>
<b>1</b>	to break down cardboard by microorganisms
<b>2</b>	to change a hydrocarbon from vapour to liquid
<b>3</b>	to react together limestone and clay to make cement
<b>4</b>	to reduce the acidity of lake water by adding limestone

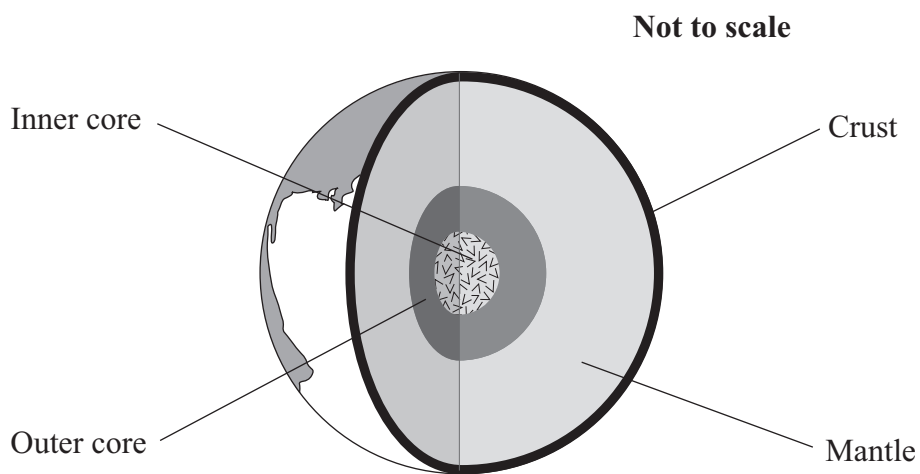
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**SECTION B**Questions **SIX** and **SEVEN**.In these questions choose the best **two** answers.Do **not** choose more than two.Mark your choices on the answer sheet.

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**QUESTION SIX**

The diagram shows the layered structure of the Earth.

Which **two** statements are correct?**the core is made of iron and copper****the crust contains sedimentary, metamorphic and igneous rocks****the mantle extends more than halfway to the Earth's centre****the mantle has all the properties of a liquid but remains solid****the outer part of the core is liquid****Turn over ►**

**QUESTION SEVEN**

This question is about elements, mixtures and compounds.

Which **two** statements are correct?

**air is a compound**

**carbon dioxide is an element**

**concrete is a mixture**

**crude oil is a mixture of several elements**

**substances with different boiling points can be separated by distillation**



**Turn over for the next question**

**Turn over ►**

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

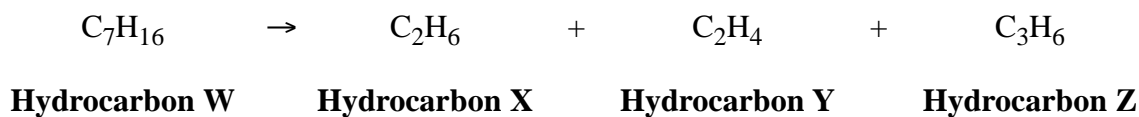
Each of these questions has four parts.

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

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**QUESTION EIGHT**

The equation shows a hydrocarbon with large molecules being broken down into hydrocarbons with smaller molecules.

**8.1** What is this process called?

- A Combination
- B Combustion
- C Condensation
- D Cracking

**8.2** The breakdown of the hydrocarbon with large molecules is done by . . .

- A fractional distillation.
- B passing the hot vapour over a hot catalyst.
- C reaction with a strong acid.
- D reaction with a strong alkali.

**8.3** Which of the hydrocarbons is most difficult to ignite?

- A Hydrocarbon **W**
- B Hydrocarbon **X**
- C Hydrocarbon **Y**
- D Hydrocarbon **Z**

**8.4** Which of the hydrocarbons has the highest boiling point?

- A Hydrocarbon **W**
- B Hydrocarbon **X**
- C Hydrocarbon **Y**
- D Hydrocarbon **Z**

**Turn over for the next question**

**Turn over ►**

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**QUESTION NINE**

This question is about limestone and some substances that can be made from it.

**9.1** Quicklime is made . . .

- A by dissolving slaked lime in water.
- B by heating limestone strongly.
- C by the reaction of hydrochloric acid with limestone.
- D by the reaction of limestone with carbon dioxide.

**9.2** Which word equation shows how slaked lime can be made?

- A calcium carbonate  $\rightarrow$  calcium hydroxide + water
- B calcium carbonate + water  $\rightarrow$  calcium hydroxide + carbon dioxide
- C calcium oxide  $\rightarrow$  calcium hydroxide + water
- D calcium oxide + water  $\rightarrow$  calcium hydroxide

**9.3** Both limestone and slaked lime are used . . .

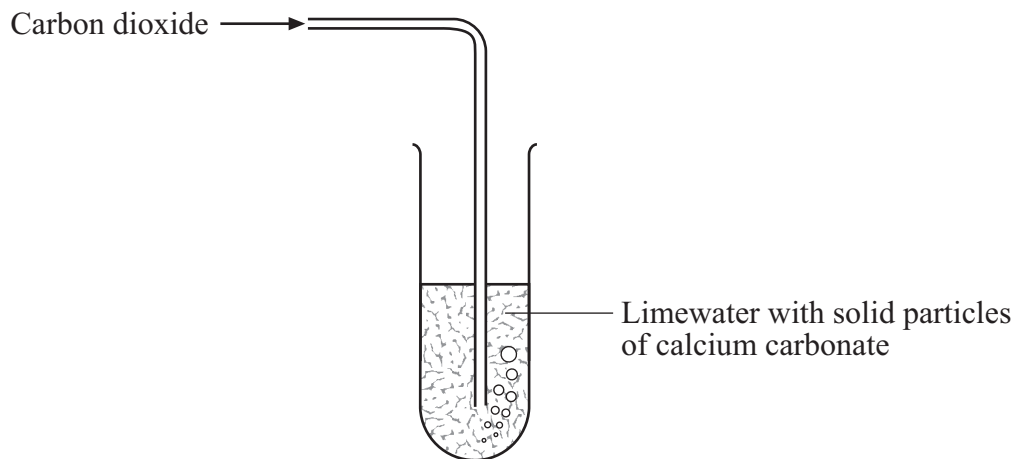
- A to make building blocks for houses.
- B to make cement.
- C to make glass.
- D to reduce the acidity of soils.

**9.4** Slaked lime dissolves slightly in water.

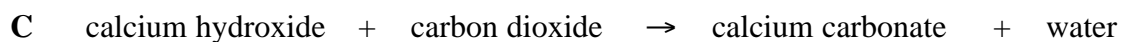
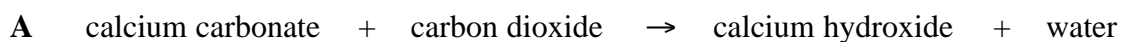
The solution is called limewater.

If carbon dioxide gas is bubbled into limewater, solid particles of calcium carbonate are made.

The other product of the reaction is water.



Which of these is the word equation for this reaction?



**Turn over for the next question**

**Turn over ►**

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**QUESTION TEN**

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

<b>Earth's early atmosphere</b>	<b>Earth's present-day atmosphere</b>
mainly carbon dioxide water vapour very little oxygen small amounts of other gases	mainly nitrogen and oxygen water vapour little carbon dioxide small amounts of other gases

**10.1** Most of the carbon dioxide in the early atmosphere came from . . .

- A the activity of animals.
- B the burning of fossil fuels.
- C the decomposition of igneous rocks.
- D the eruption of volcanoes.

**10.2** The amount of oxygen in the atmosphere increased because of . . .

- A the activity of plants.
- B the condensation of water vapour.
- C the decomposition of carbon dioxide.
- D the formation of fossil fuels.

**10.3** The amount of carbon dioxide in the atmosphere gradually reduced because of . . .

- A the evolution of animals.
- B the formation of carbonate rocks.
- C the reaction with ammonia.
- D the reaction with oxygen.

**10.4** How much oxygen and nitrogen are in the atmosphere now?

	<b>Oxygen (%)</b>	<b>Nitrogen (%)</b>
<b>A</b>	0.03	20
<b>B</b>	20	0.03
<b>C</b>	20	79
<b>D</b>	79	20

**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 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.

**biodegrade**

**combine**

**condense**

**neutralise**

<b>Process</b>	<b>Example of the process</b>
<b>1</b>	to break down cardboard by microorganisms
<b>2</b>	to change a hydrocarbon from vapour to liquid
<b>3</b>	to react together limestone and clay to make cement
<b>4</b>	to reduce the acidity of lake water by adding limestone



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**QUESTION TWO**

Chemical reactions can be represented by word equations.

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

**ammonia**

**carbon dioxide**

**ethene**

**oxygen**

sulphur + ... **1** ... → sulphur dioxide

magnesium carbonate → magnesium oxide + ... **2** ...

... **3** ... + oxygen → carbon dioxide + water

... **4** ... + oxygen → nitrogen + water

**Turn over for the next question**

**Turn over ►**

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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 elements, mixtures and compounds.

Which **two** statements are correct?**air is a compound****carbon dioxide is an element****concrete is a mixture****crude oil is a mixture of several elements****substances with different boiling points can be separated by distillation**

**QUESTION FOUR**

Use the information about **hydrocarbon E** and **hydrocarbon F** to answer the question which follows.

<b>Hydrocarbon E</b>	<b>Hydrocarbon F</b>
Formula $C_2H_6$	Formula $C_2H_4$

Which **two** rows of the table, **P**, **Q**, **R**, **S** and **T**, about these two hydrocarbons are correct?

	<b>Hydrocarbon E</b>	<b>Hydrocarbon F</b>
<b>P</b>	an alkene	an alkane
<b>Q</b>	carbon atoms joined by a single bond	carbon atoms joined by a double bond
<b>R</b>	carbon atoms joined to hydrogen atoms by double bonds	carbon atoms joined to hydrogen atoms by single bonds
<b>S</b>	no effect on bromine water	turns bromine water colourless
<b>T</b>	unsaturated	saturated

**Turn over for the next question**

**Turn over ►**

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

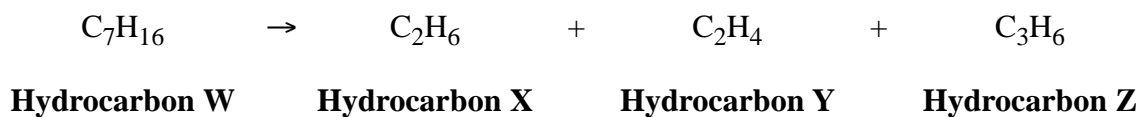
Each of these questions has four parts.

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

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**QUESTION FIVE**

The equation shows a hydrocarbon with large molecules being broken down into hydrocarbons with smaller molecules.

**5.1** What is this process called?

- A** Combination
- B** Combustion
- C** Condensation
- D** Cracking

**5.2** The breakdown of the hydrocarbon with large molecules is done by . . .

- A** fractional distillation.
- B** passing the hot vapour over a hot catalyst.
- C** reaction with a strong acid.
- D** reaction with a strong alkali.

**5.3** Which of the hydrocarbons is most difficult to ignite?

- A Hydrocarbon **W**
- B Hydrocarbon **X**
- C Hydrocarbon **Y**
- D Hydrocarbon **Z**

**5.4** Which of the hydrocarbons has the highest boiling point?

- A Hydrocarbon **W**
- B Hydrocarbon **X**
- C Hydrocarbon **Y**
- D Hydrocarbon **Z**

**Turn over for the next question**

**Turn over ►**

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**QUESTION SIX**

This question is about limestone and some substances that can be made from it.

**6.1** Quicklime is made . . .

- A by dissolving slaked lime in water.
- B by heating limestone strongly.
- C by the reaction of hydrochloric acid with limestone.
- D by the reaction of limestone with carbon dioxide.

**6.2** Which word equation shows how slaked lime can be made?

- A calcium carbonate  $\rightarrow$  calcium hydroxide + water
- B calcium carbonate + water  $\rightarrow$  calcium hydroxide + carbon dioxide
- C calcium oxide  $\rightarrow$  calcium hydroxide + water
- D calcium oxide + water  $\rightarrow$  calcium hydroxide

**6.3** Both limestone and slaked lime are used . . .

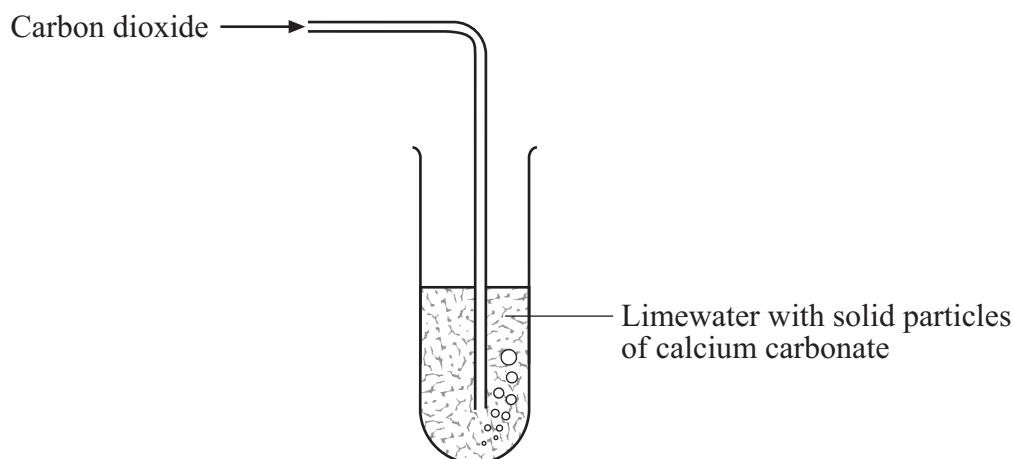
- A to make building blocks for houses.
- B to make cement.
- C to make glass.
- D to reduce the acidity of soils.

**6.4** Slaked lime dissolves slightly in water.

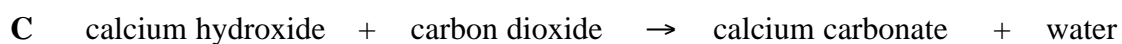
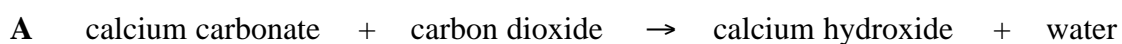
The solution is called limewater.

If carbon dioxide gas is bubbled into limewater, solid particles of calcium carbonate are made.

The other product of the reaction is water.



Which of these is the word equation for this reaction?



**Turn over for the next question**

**Turn over ►**

**QUESTION SEVEN**

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

<b>Earth's early atmosphere</b>	<b>Earth's present-day atmosphere</b>
mainly carbon dioxide water vapour very little oxygen small amounts of other gases	mainly nitrogen and oxygen water vapour little carbon dioxide small amounts of other gases

**7.1** Most of the carbon dioxide in the early atmosphere came from . . .

- A** the activity of animals.
- B** the burning of fossil fuels.
- C** the decomposition of igneous rocks.
- D** the eruption of volcanoes.

**7.2** The amount of oxygen in the atmosphere increased because of . . .

- A** the activity of plants.
- B** the condensation of water vapour.
- C** the decomposition of carbon dioxide.
- D** the formation of fossil fuels.

**7.3** The amount of carbon dioxide in the atmosphere gradually reduced because of . . .

- A** the evolution of animals.
- B** the formation of carbonate rocks.
- C** the reaction with ammonia.
- D** the reaction with oxygen.



**7.4** How much oxygen and nitrogen are in the atmosphere now?

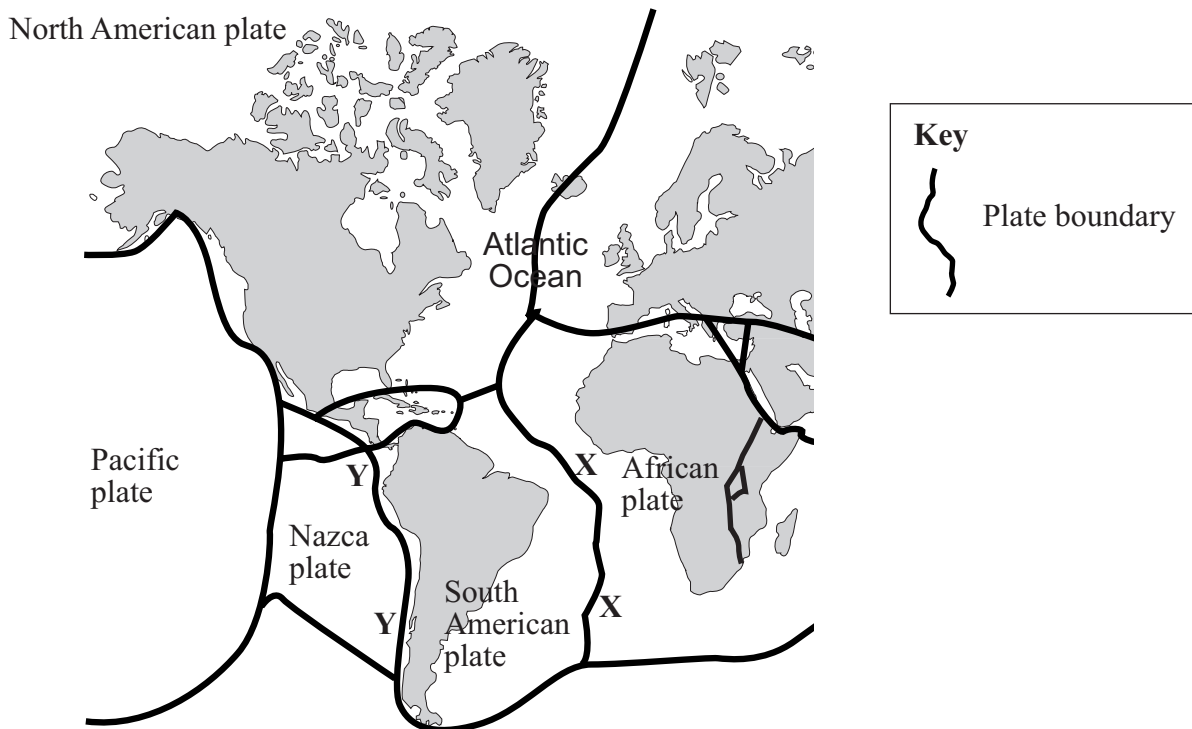
	<b>Oxygen (%)</b>	<b>Nitrogen (%)</b>
<b>A</b>	0.03	20
<b>B</b>	20	0.03
<b>C</b>	20	79
<b>D</b>	79	20

**Turn over for the next question**

**Turn over ►**

## QUESTION EIGHT

The diagram shows some of the major tectonic plates and plate boundaries of the lithosphere.



**8.1** Along the plate boundary marked **X – X**, magma rises and solidifies to form new oceanic crust.

What is happening to the tectonic plates at this boundary?

- A One is rising above the other.
- B They are moving apart.
- C They are moving together.
- D They are sliding past each other.

**8.2** Volcanic rocks are formed from the magma rising at **X – X**.

Where will the youngest of these volcanic rocks be found?

- A Alongside the oceanic ridge
- B Close to the west coast of Africa
- C In the deepest part of the ocean basins
- D Near the east coast of South America

**8.3** At the plate boundary marked **Y – Y**, earthquakes are common and oceanic crust is subducted.

What is happening to the tectonic plates at this boundary?

- A** They are moving apart.
- B** They are moving together.
- C** They are sliding past each other.
- D** They are stationary.

**8.4** What is happening to the rocks at the edge of the continental plate at the boundary marked **Y – Y**?

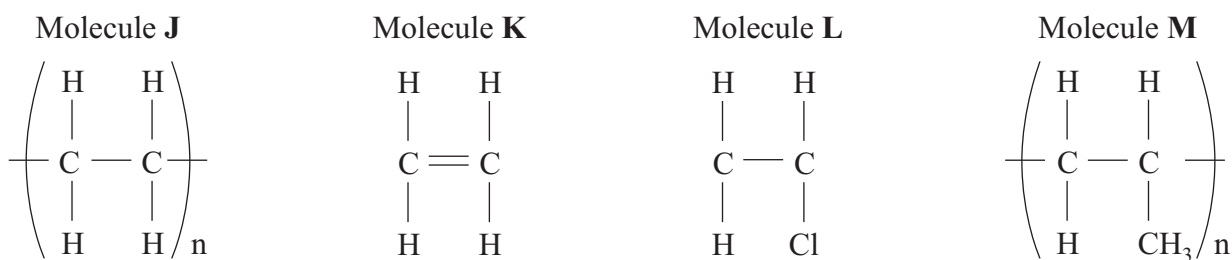
- A** They are compressed and form metamorphic rocks.
- B** They are compressed into sedimentary rocks.
- C** They are converted into basaltic crust.
- D** They melt to form magma.

**Turn over for the next question**

**Turn over ►**

**QUESTION NINE**

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



**9.1** 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**

**9.2** Polymers are formed from monomers which are . . .

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

**9.3** 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**

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

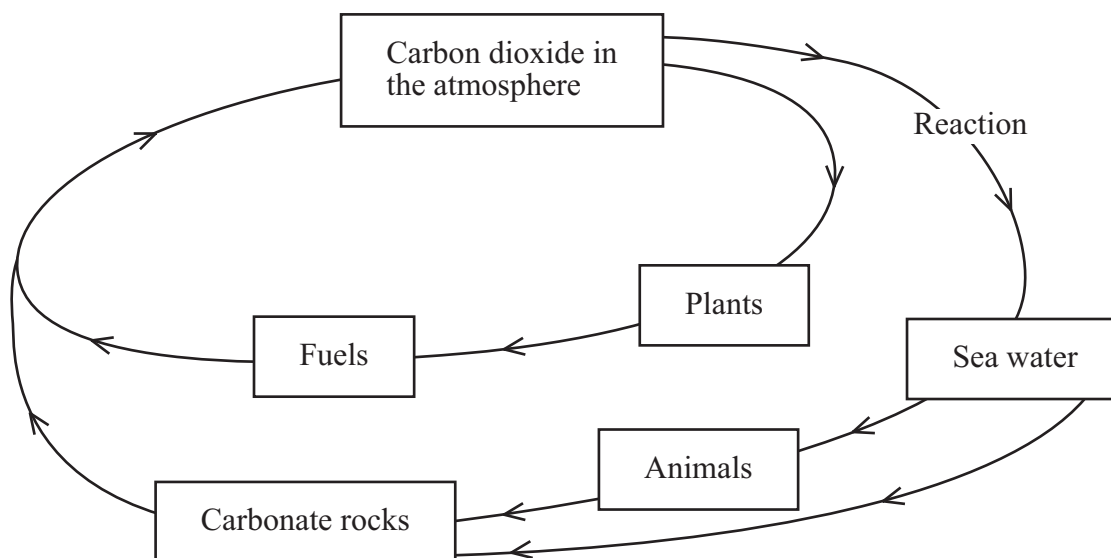
- A the polymer and carbon dioxide.
- B the polymer and hydrogen.
- C the polymer and water.
- D the polymer only.

**Turn over for the next question**

**Turn over ►**

**QUESTION TEN**

The diagram shows some of the ways in which carbon is circulated.



**10.1** Carbon dioxide is removed from the atmosphere when it reacts with sea water.

Two groups of chemicals that form are . . .

- A carbohydrates and hydrocarbons.
- B carbonates and hydrogencarbonates.
- C chlorides and sulphates.
- D nitrates and sulphates.

**10.2** Carbon dioxide is also removed from the atmosphere . . .

- A by the activity of animals.
- B when carbonate rocks are weathered.
- C when forest trees are cut and burned.
- D when fossil fuels are formed.

**10.3** Carbon dioxide is returned to the atmosphere . . .

- A by the accumulation of carbonate sediments in the seas.
- B by thermal decomposition of limestone in the Earth's crust.
- C when fossil fuels are formed.
- D when large areas are covered in trees.

**10.4** Over the last 200 years, the amount of carbon dioxide in the atmosphere has increased slightly.

This is mainly because . . .

- A more nuclear power stations have come into operation.
- B there has been increased volcanic activity.
- C we are using less limestone for building.
- D we are using more fossil fuels.

**END OF TEST**

**There are no questions printed on this page**