

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.

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.
The Higher Tier starts on page 13 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 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**

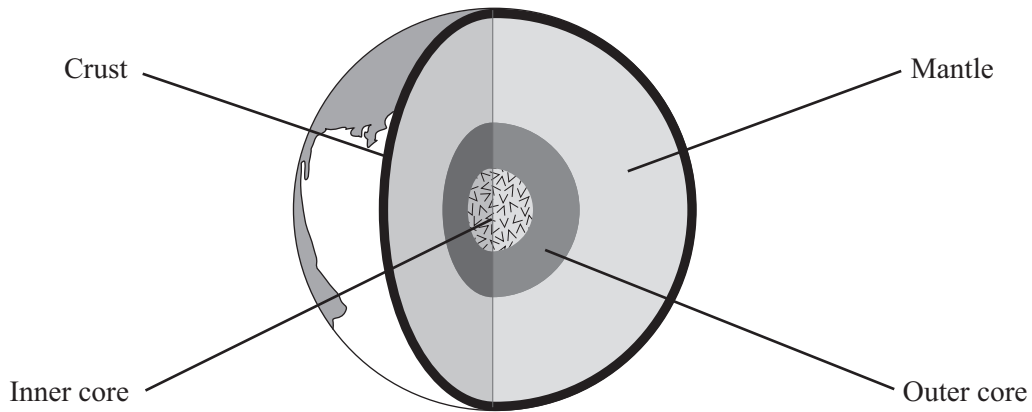
Limestone can be heated in a kiln to make quicklime, which is also called **2**

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

Gas	What we can say about the gas
1	it is the main gas in the atmosphere of Venus
2	it makes up about 20% of Earth's atmosphere
3	it makes up about 80% of Earth's atmosphere
4	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

Substance	What we use it for
1	to make cement
2	to make glass
3	to make plastic bags and plastic bottles
4	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

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

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

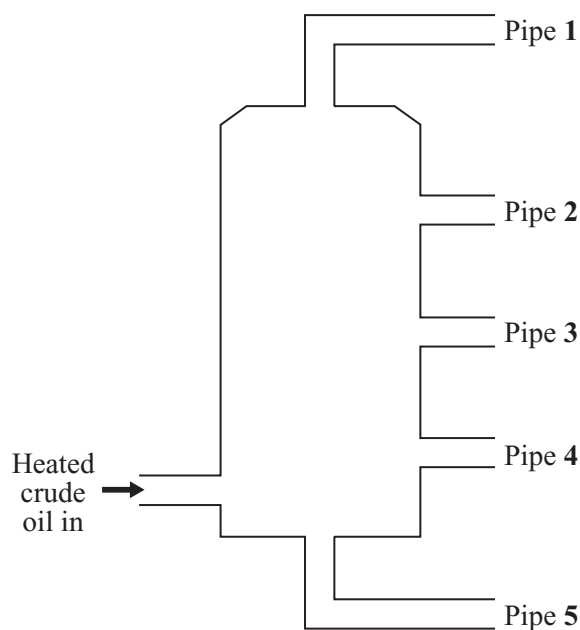
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION EIGHT

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?

	Most volatile	Most viscous
A	Pipe 1	Pipe 1
B	Pipe 1	Pipe 5
C	Pipe 5	Pipe 1
D	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?

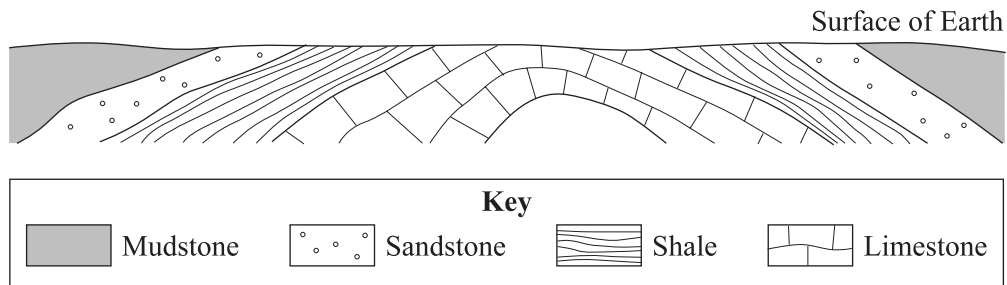
	Highest boiling point	Most easily ignited
A	Pipe 1	Pipe 1
B	Pipe 1	Pipe 5
C	Pipe 5	Pipe 1
D	Pipe 5	Pipe 5

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?

	First formed		Last formed	
A	limestone	shale	sandstone	mudstone
B	mudstone	sandstone	shale	limestone
C	sandstone	shale	limestone	mudstone
D	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

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

This question is about processes that change things.

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

combining

condensing

cracking

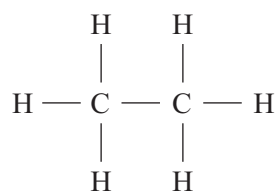
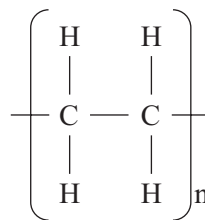
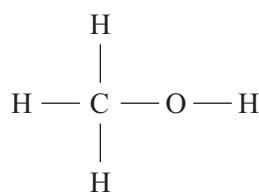
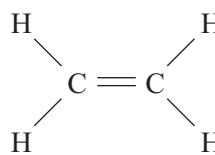
neutralising

Process	Example of the process
1	breaking down the alkane, decane ($C_{10}H_{22}$), to form octane (C_8H_{18}) and ethene (C_2H_4)
2	forming the oceans on Earth from water (vapour) in the atmosphere
3	reacting together hydrogen and oxygen to form water (vapour)
4	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
1	it is a hydrocarbon which turns bromine water colourless
2	it is a polymer
3	it is a saturated hydrocarbon with a low melting point
4	it is not a hydrocarbon

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

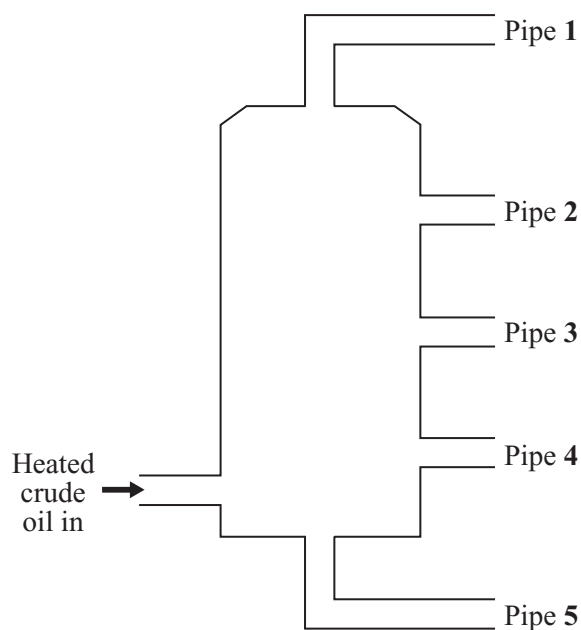
Each of these questions has four parts.

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?

	Most volatile	Most viscous
A	Pipe 1	Pipe 1
B	Pipe 1	Pipe 5
C	Pipe 5	Pipe 1
D	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?

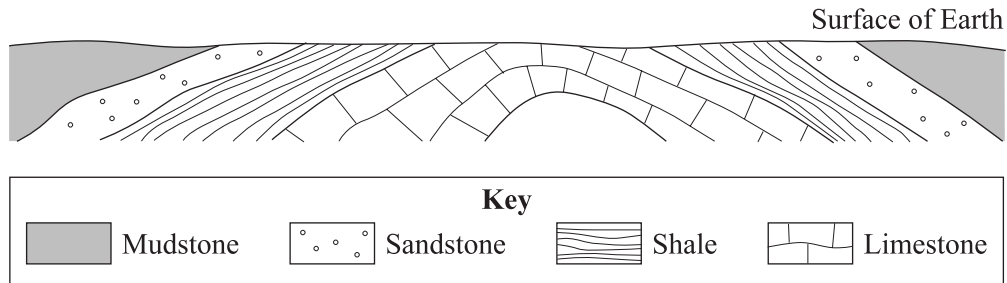
	Highest boiling point	Most easily ignited
A	Pipe 1	Pipe 1
B	Pipe 1	Pipe 5
C	Pipe 5	Pipe 1
D	Pipe 5	Pipe 5

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?

	First formed		Last formed	
A	limestone	shale	sandstone	mudstone
B	mudstone	sandstone	shale	limestone
C	sandstone	shale	limestone	mudstone
D	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.

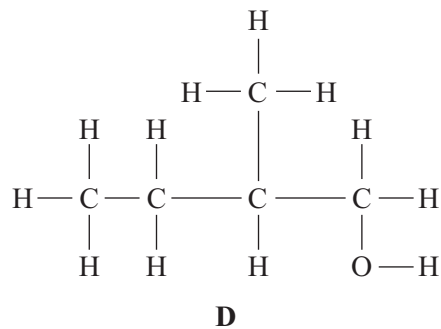
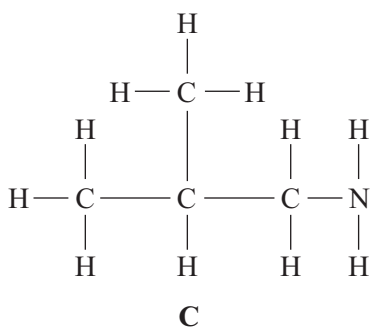
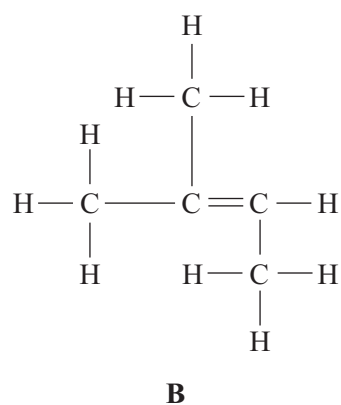
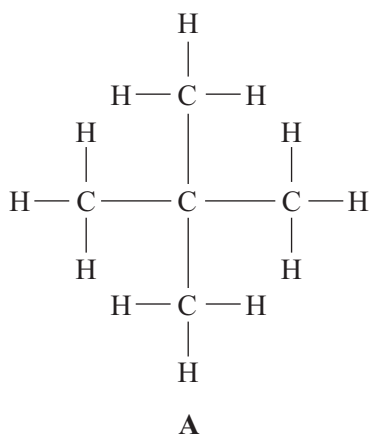
Turn over ►

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?

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

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

	Nitrogen	Oxygen	Carbon dioxide
A	increased	increased	decreased
B	decreased	decreased	stayed the same
C	stayed the same	increased	decreased
D	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