

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE SCIENCE A CHEMISTRY

F

Foundation Tier Unit Chemistry C1

Thursday 18 May 2017

Morning

Time allowed: 1 hour

Materials

For this paper you must have:

- a ruler
- the Chemistry Data Sheet (enclosed).

You may use a calculator.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 7 should be answered in continuous prose. In this question you will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

Advice

- In all calculations, show clearly how you work out your answer.

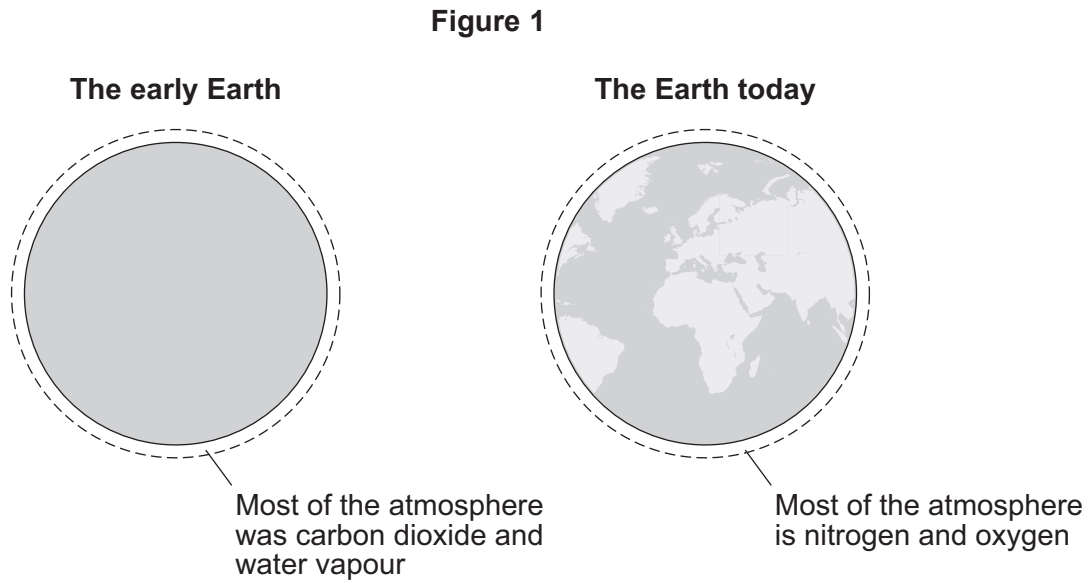
For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	



Answer **all** questions in the spaces provided.

- 1 This question is about gases in the Earth's atmosphere.

Figure 1 shows the atmospheres of the early Earth and of the Earth today.



- 1 (a) (i) Use the correct answers from the box to complete the sentence.

[2 marks]

dissolved	evaporated
locked up	released

The amount of carbon dioxide in the early Earth's atmosphere decreased because

carbon dioxide was _____ in the oceans

and gradually became _____ in sedimentary rocks as carbonates.

- 1 (a) (ii) Plants and algae used carbon dioxide and water vapour in the early Earth's atmosphere to produce oxygen.

Give the name of this process.

[1 mark]



1 (b) The Earth's atmosphere today contains about 0.04% carbon dioxide.

1 (b) (i) Draw **one** line from each gas to the approximate percentage of gas in the Earth's atmosphere today.

[3 marks]

Gas	Approximate percentage of gas in the Earth's atmosphere today
	1
Argon	10
	20
Nitrogen	50
Oxygen	80
	90

1 (b) (ii) Give **one** reason why the amount of carbon dioxide in the Earth's atmosphere has increased in the last 50 years.

[1 mark]

7

Turn over ►



2 (c) What are **two** reasons why lithium, sodium and potassium are in the same group of the periodic table?

[2 marks]

Tick (✓) **two** boxes.

Low melting points

Same number of electrons in the outer shell

Similar atomic (proton) numbers

Similar chemical reactions

Two electrons in the innermost shell

2 (d) Complete each sentence.

[2 marks]

The elements in Group 0 are called _____ gases.

The elements in the central block are known as _____ metals.

2 (e) Use the correct word from the box to complete each sentence.

[2 marks]

alloys ions molecules polymers protons

Atoms of fluorine gain electrons to form fluoride _____ .

Atoms of fluorine share electrons to form fluorine _____ .

8

Turn over ►



3 This question is about metals.

3 (a) Complete the word equation for the reaction of magnesium with oxygen.

[1 mark]

magnesium + oxygen \longrightarrow _____

3 (b) Iron oxide is reduced to iron in a blast furnace.

The chemical equation for the reaction is:



3 (b) (i) Give the name of the element used for the reduction of iron oxide.

[1 mark]

3 (b) (ii) How can you tell that iron oxide is reduced?

[1 mark]

3 (b) (iii) Complete the sentences.

[3 marks]

For many uses, iron from the blast furnace is too _____ .

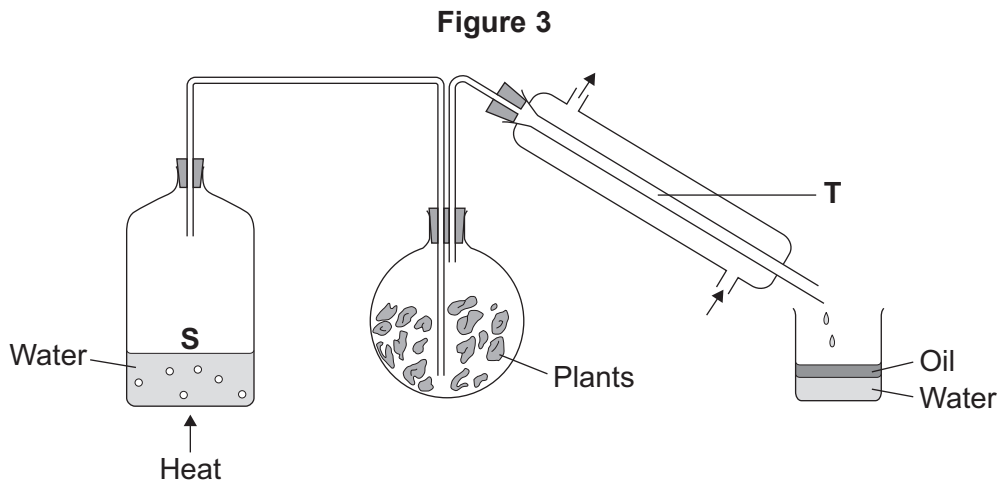
For many uses, pure iron is too _____ .

Mixtures of iron with carbon are called _____ .



4 Some plants contain oils that can be extracted.

Figure 3 shows a process used to separate oils from plants.



4 (a) What is the name of this process?

[1 mark]

Tick (✓) **one** box.

Displacement

Distillation

Pressing

4 (b) (i) Describe the change of state at **S**.

[1 mark]

4 (b) (ii) Describe the change of state at **T**.

[1 mark]

Question 4 continues on the next page

Turn over ►



4 (c) **Table 1** gives the melting points and boiling points of some plant oils.

Table 1

Plant oil	Melting point in °C	Boiling point in °C
Olive	-41	+216
Sunflower	-17	+227
Corn	-11	+232
Peanut	-2	+232
Coconut	+25	+177

4 (c) (i) An article stated that:

'plant oils with lower melting points are healthier because they are high in unsaturated oils'.

Which plant oil in **Table 1** is the healthiest according to the article?

[1 mark]

4 (c) (ii) Which plant oil in **Table 1** is solid at room temperature (20 °C)?

[1 mark]

4 (c) (iii) Which plant oil in **Table 1** is liquid over the greatest temperature range?

[1 mark]

4 (d) Give **two** ways that food cooked in plant oils would be different from the same food cooked in water.

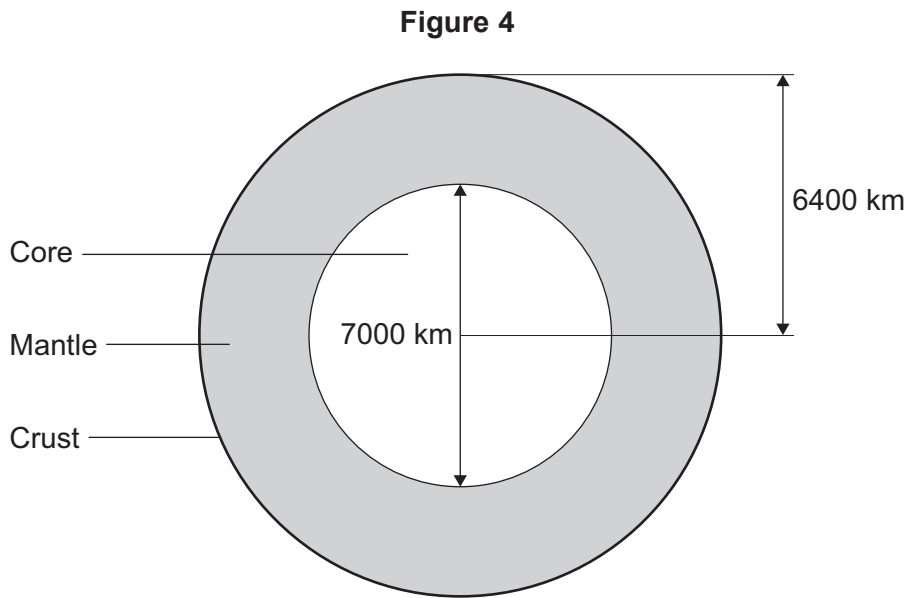
[2 marks]

1 _____

2 _____



5 (a) Figure 4 shows the layered structure of the Earth.



5 (a) (i) The radius of the Earth is 6400 km.

Calculate the distance from the surface of the crust to the surface of the core.

[2 marks]

Distance = _____ km

5 (a) (ii) Use the correct answers from the box to complete the sentences.

Each word can be used only once.

[4 marks]

currents	concentrations	distances
plates	processes	speeds

Tectonic _____ move at _____ of a few centimetres per year.

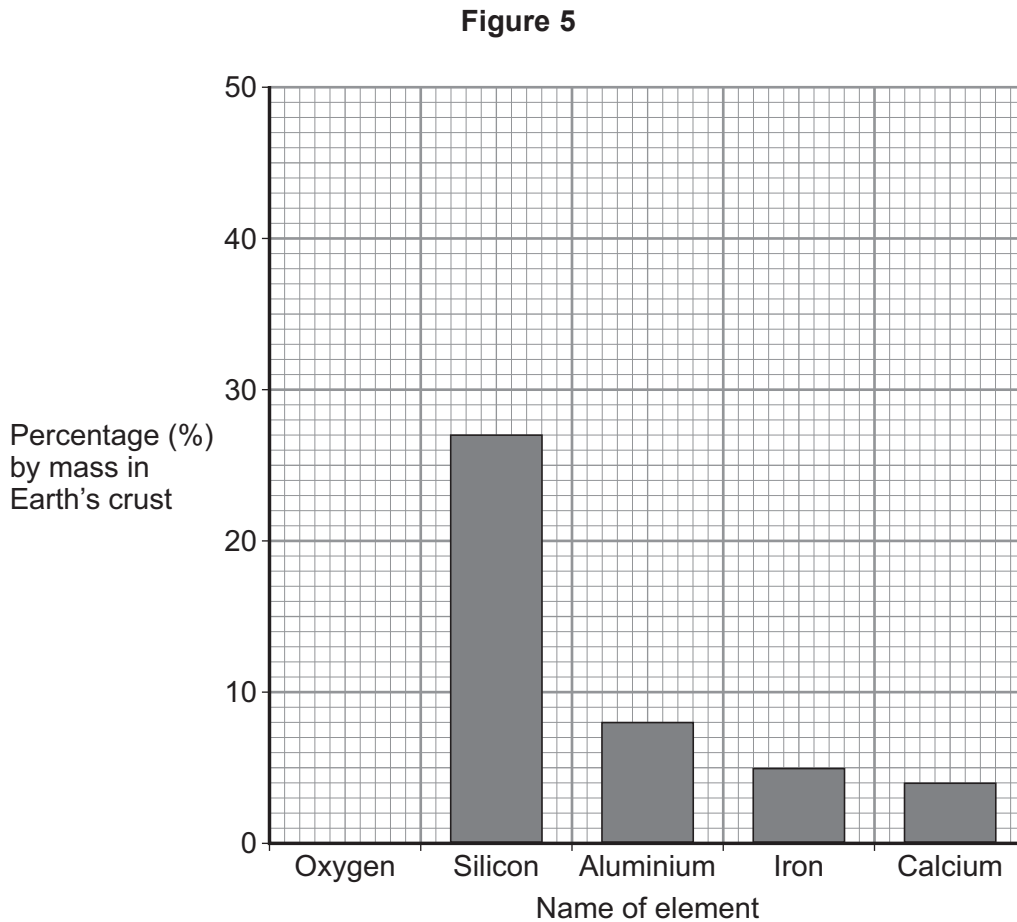
This movement is caused by convection _____ within the Earth's mantle

driven by heat released by natural radioactive _____ .

Turn over ►



5 (b) Figure 5 shows the percentage by mass of some elements in the Earth's crust.



5 (b) (i) The percentage by mass of oxygen is 47%.

Draw the bar for oxygen on **Figure 5**.

[1 mark]

5 (b) (ii) Look at your completed bar chart.

What is the percentage by mass of all the other elements not shown on the chart in the Earth's crust?

[1 mark]

Tick (✓) **one** box.

1%

9%

20%



5 (b) (iii) There is about 0.007% by mass of copper in the Earth's crust.

Suggest why copper should be recycled.

[1 mark]

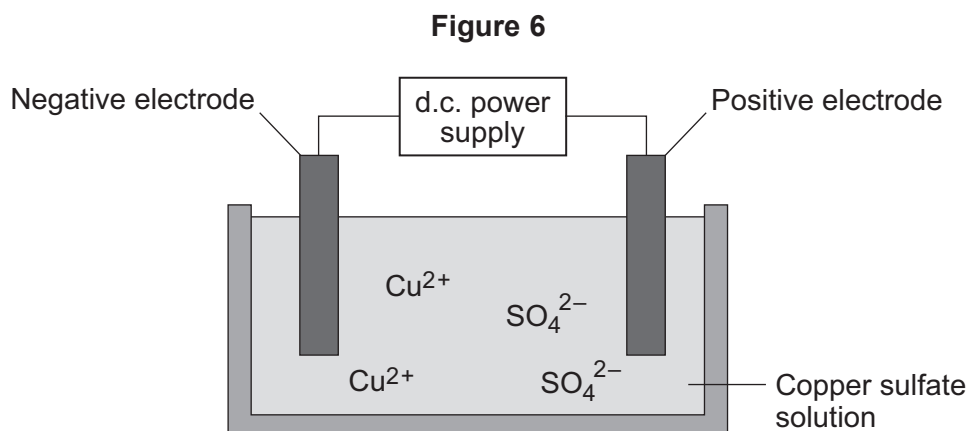
Question 5 continues on the next page

Turn over ►



5 (b) (iv) Bioleaching of low-grade copper ores produces a solution of copper sulfate.

Figure 6 shows apparatus used to obtain copper from copper sulfate solution.



What is the name of the process shown in **Figure 6**?

[1 mark]

Tick (✓) **one** box.

Combustion

Cracking

Electrolysis

Hydration

5 (b) (v) Explain why copper ions move towards the negative electrode in **Figure 6**.

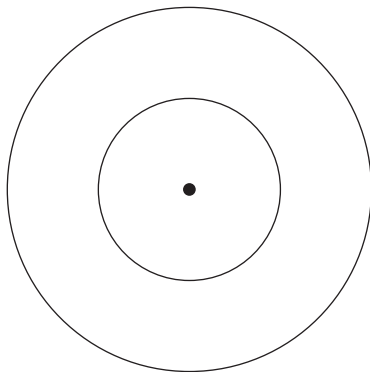
[2 marks]



6 This question is about compounds of carbon.

6 (a) **Figure 7** shows an atom with two energy levels (shells).

Figure 7



6 (a) (i) A carbon atom has six electrons.

Complete **Figure 7** to show the electronic structure of a carbon atom.

Use **x** to represent an electron.

[1 mark]

6 (a) (ii) Complete the following description about the central part of this carbon atom.

[3 marks]

The central part is made up of six neutrons that have no electrical charge and _____

6 (b) Crude oil is a mixture of compounds. These compounds are mainly hydrocarbons.

What does the term hydrocarbon mean?

[1 mark]

Turn over ►



6 (c) Alkanes and alkenes are hydrocarbons.

Table 2 shows the boiling points of some alkanes and alkenes.

Table 2

Alkanes

Name	Formula	Boiling point in °C
Ethane	C ₂ H ₆	-88
Propane	C ₃ H ₈	-42
Butane	C ₄ H ₁₀	0
Pentane	C ₅ H ₁₂	+36
Hexane	C ₆ H ₁₄	+69

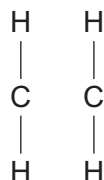
Alkenes

Name	Formula	Boiling point in °C
Ethene	C ₂ H ₄	-104
Propene	C ₃ H ₆	-48
Butene	C ₄ H ₈	-6
Pentene	C ₅ H ₁₀	+30
Hexene	C ₆ H ₁₂	+64

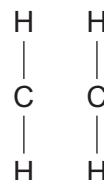
6 (c) (i) Complete the displayed structure of ethane and the displayed structure of ethene.

[2 marks]

Ethane



Ethene



6 (c) (ii) Describe the relationship between the number of carbon atoms in an alkane molecule and the boiling point of the alkane molecule.

[1 mark]

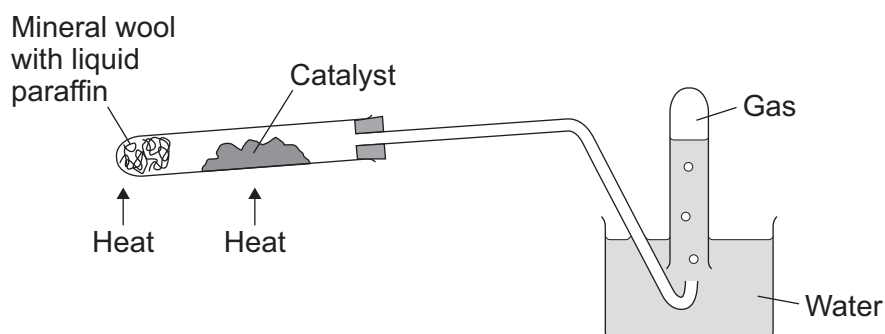


6 (c) (iii) Use the information in **Table 2** to compare the boiling points of alkanes with the boiling points of alkenes.

[2 marks]

6 (d) A student used the apparatus in **Figure 8** to investigate what happens when liquid paraffin is heated to a high temperature.

Figure 8



Liquid paraffin contains alkanes.

Describe what happens to the alkane molecules in this investigation.

[3 marks]

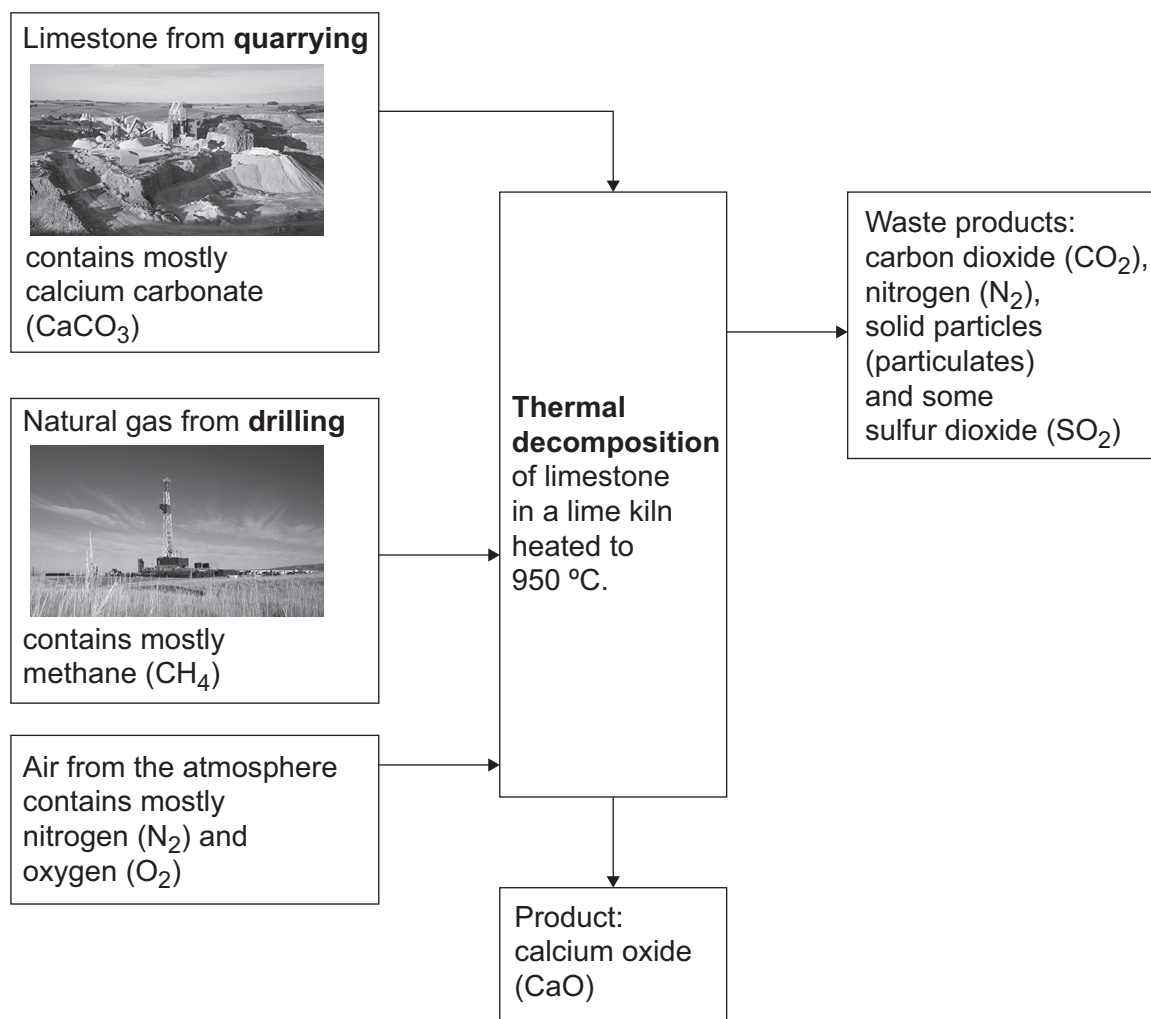


- 7 In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Limestone is heated in a lime kiln to produce calcium oxide.

Figure 9 shows the reactants used and the products made in a lime kiln.

Figure 9



Use information from **Figure 9** to explain the potential environmental impacts of quarrying, drilling and the thermal decomposition of limestone used in the production of calcium oxide.

[6 marks]



Extra space

6

END OF QUESTIONS



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