

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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# 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	
<b>TOTAL</b>	

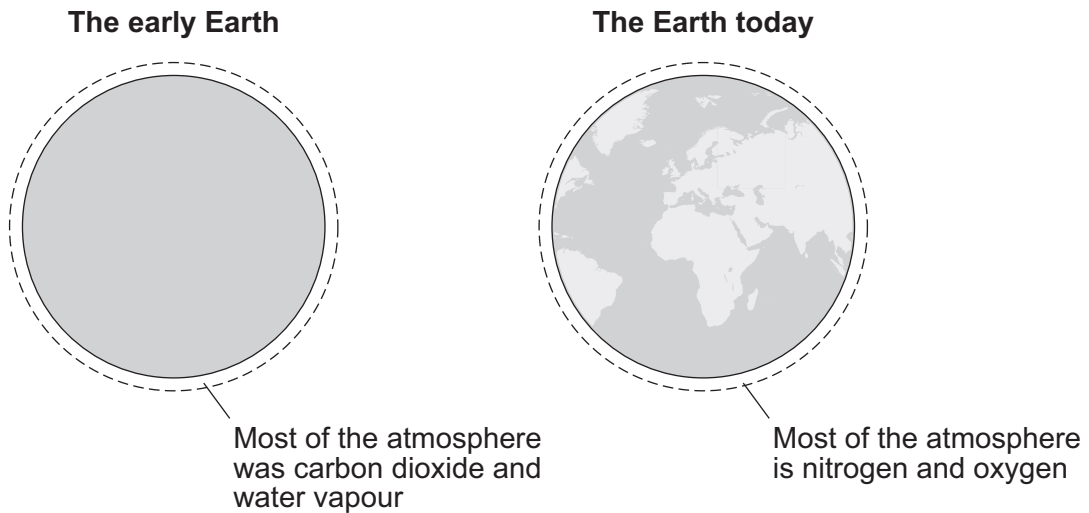


Answer **all** questions in the spaces provided.

**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.

**Figure 1**



**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
	80
Oxygen	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]

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7

Turn over ►



2 Use the Chemistry Data Sheet to help you answer this question.

Figure 2 shows part of the periodic table.

Figure 2

	1	2														0		
																	He	
	Li	Be															F	Ne
	Na	Mg															Cl	Ar
	K	Ca															Br	Kr

2 (a) Give the name of the element that should be in the shaded box.

[1 mark]

---

2 (b) How many different elements are there in the complete periodic table?

[1 mark]

Tick (✓) **one** box.

About 36

About 100

About 500



**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 \_\_\_\_\_ .



**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 \_\_\_\_\_ .

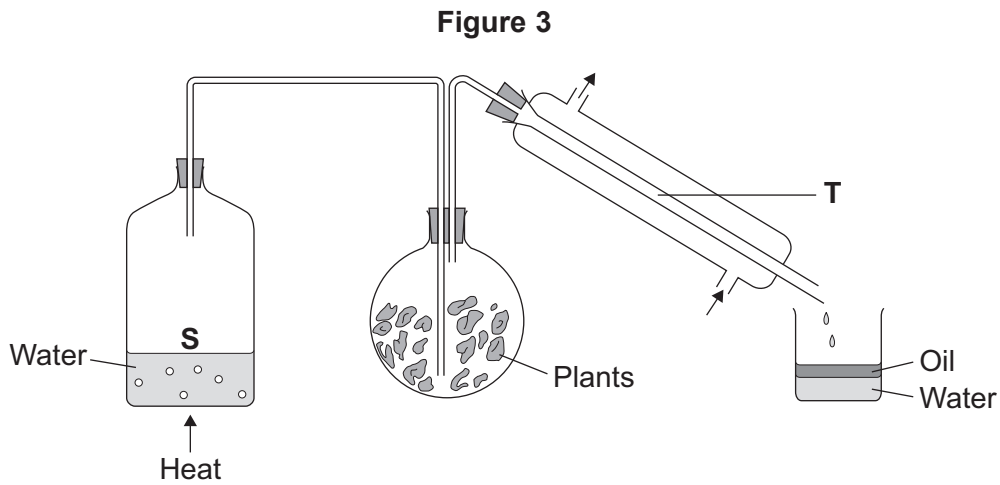
For many uses, pure iron is too \_\_\_\_\_ .

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]

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

[1 mark]

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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]

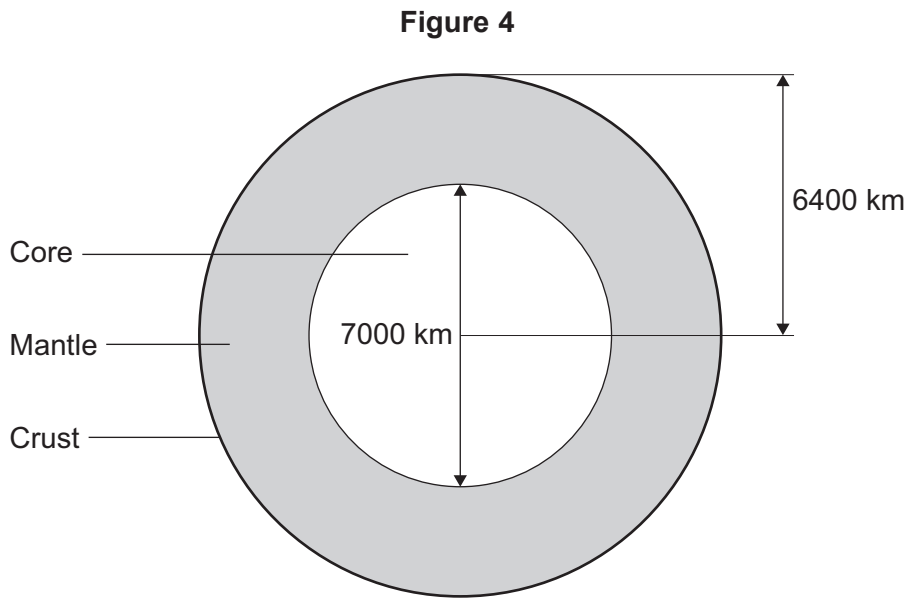
1 \_\_\_\_\_

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]

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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

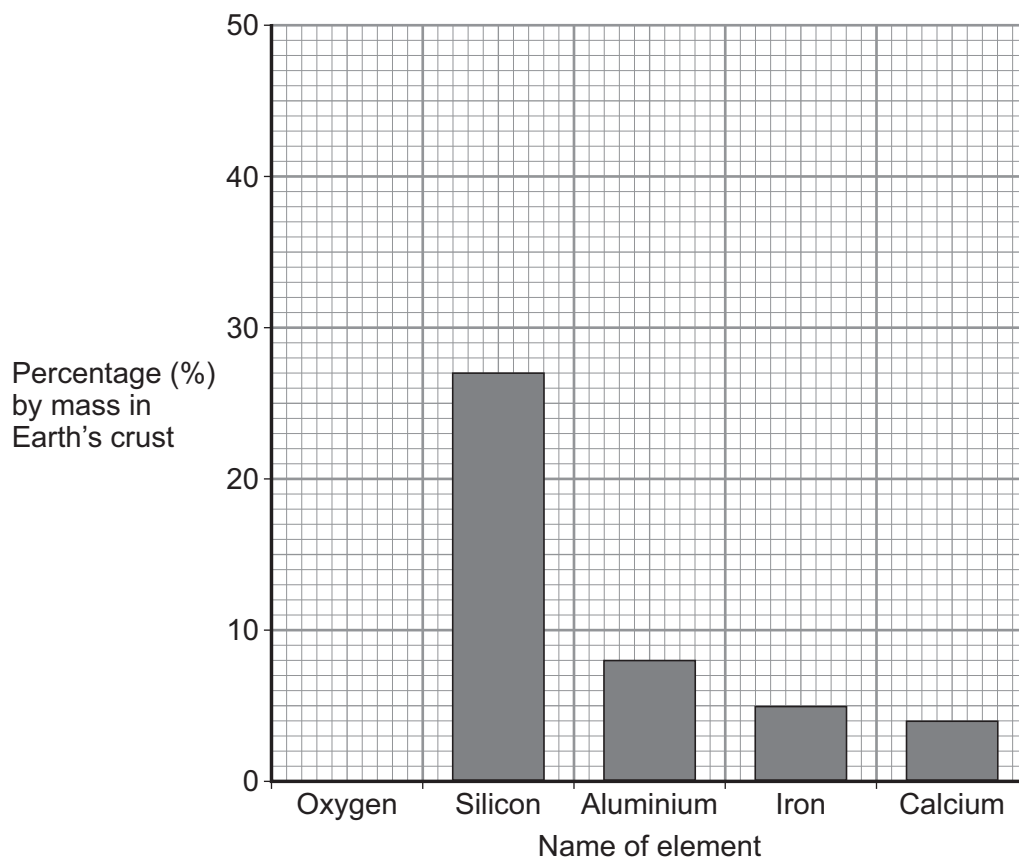
driven by heat released by natural radioactive \_\_\_\_\_ .

Turn over ►



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

Figure 5



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]**

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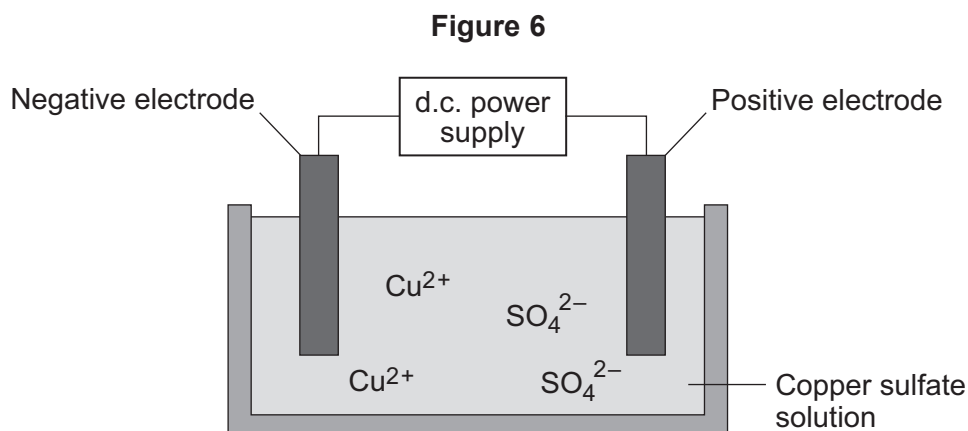
**Question 5 continues on the next page**

**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]

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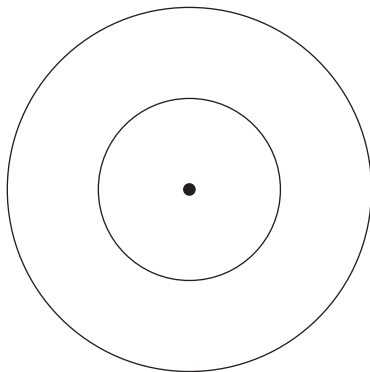
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6 This question is about compounds of carbon.

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 \_\_\_\_\_

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

What does the term hydrocarbon mean?

[1 mark]

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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 <sub>2</sub> H <sub>6</sub>	-88
Propane	C <sub>3</sub> H <sub>8</sub>	-42
Butane	C <sub>4</sub> H <sub>10</sub>	0
Pentane	C <sub>5</sub> H <sub>12</sub>	+36
Hexane	C <sub>6</sub> H <sub>14</sub>	+69

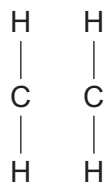
Alkenes

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

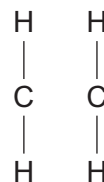
6 (c) (i) Complete the displayed structure of ethane and the displayed structure of ethene.

[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]

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

[2 marks]

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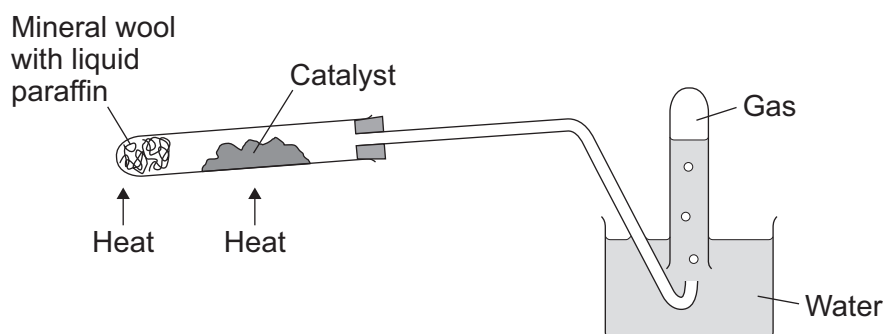
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6 (d) A student used the apparatus in **Figure 8** to investigate what happens when liquid paraffin is heated to a high temperature.

**Figure 8**



Liquid paraffin contains alkanes.

Describe what happens to the alkane molecules in this investigation.

[3 marks]

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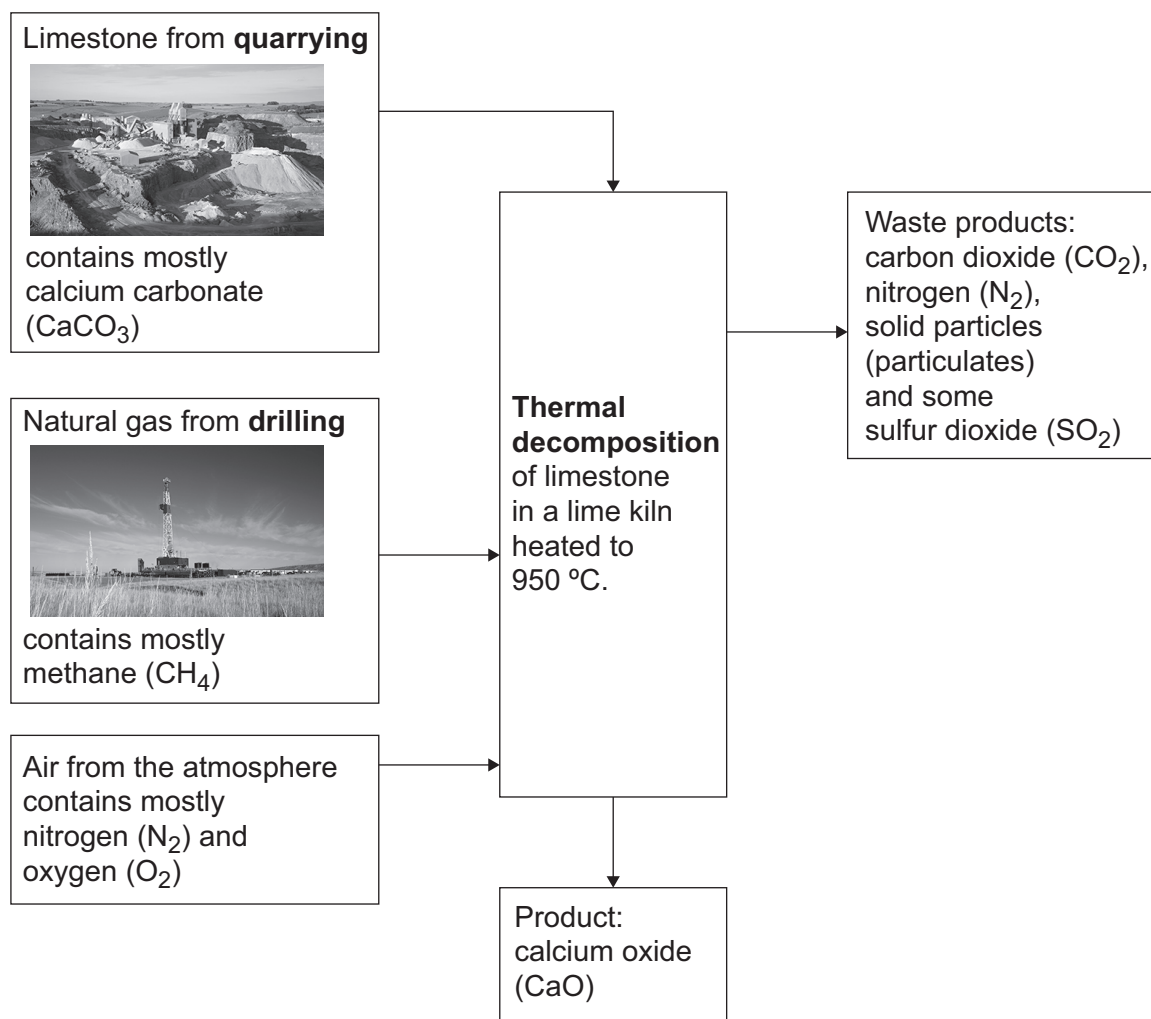


- 7 In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

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]**

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