| Centre Number | | | | | | Candidate Number | | | | |
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| Surname | | | | | | | | | | |
| Other Names | | | | | | | | | | |
| Candidate Signature | | | | | | | | | | |

| For Examiner's Use | |
|---|---|
| Examiner's Initials | |
| Question | Mark |
| 1 | |
| 2 | |
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| TOTAL | |

AQA

General Certificate of Secondary Education
Foundation Tier
June 2012

# Science B
**Unit Chemistry C1**

**CHY1F**

**F**

# Chemistry
**Unit Chemistry C1**

**Written Paper**

**Friday 15 June 2012 1.30 pm to 2.15 pm**

**For this paper you must have:**
- a ruler.

You may use a calculator.

**Time allowed**
- 45 minutes

**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 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

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

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

**1** Iron is extracted from its ore.

**1 (a)** Iron ore is quarried.

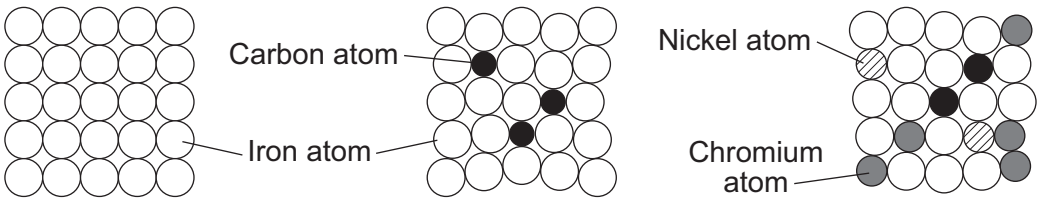
Quarrying iron ore has impacts that cause environmental problems.

Tick (✓) **two** impacts of quarrying that cause environmental problems.

| Impact of quarrying | Tick (✓) |
|---|---|
| puts off tourists | |
| causes dust pollution | |
| increases jobs | |
| increases traffic | |

*(2 marks)*

**1 (b)** The diagrams represent the atoms in iron and the atoms in two alloys of iron.




**Pure iron** **High carbon steel** **Stainless steel**

Use the diagrams to help you to answer these questions.

**1 (b) (i)** Complete the sentence.

Pure iron does **not** have many uses because .....

..... .

*(1 mark)*

**1 (b) (ii)** Stainless steel is more expensive than pure iron.

Suggest why.

.....

.....

*(1 mark)*

**1 (c)** Draw a ring around the correct answer to complete each sentence.

**1 (c) (i)** Pure iron is

- a compound.
- an element.
- a mixture.

*(1 mark)*

**1 (c) (ii)** High carbon steel is used for a drill bit because it is

- brittle.
- easily bent.
- hard.

*(1 mark)*

**1 (c) (iii)** Stainless steel is used to make cutlery because it

- contains three different atoms.
- melts at a very high temperature.
- is resistant to corrosion.

*(1 mark)*

7

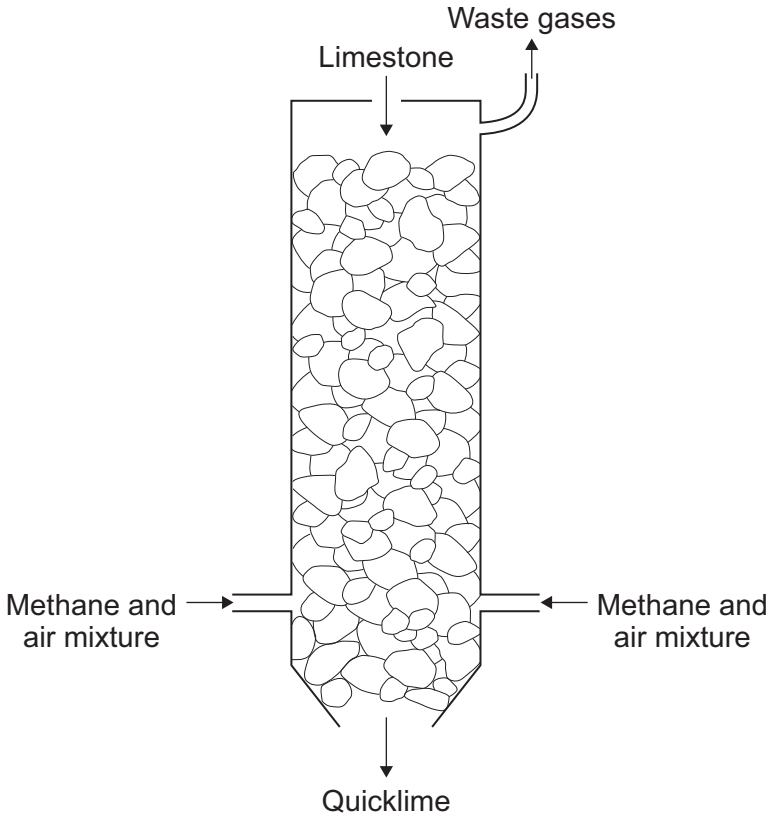
**2** Limestone is mainly calcium carbonate, $CaCO_3$

**2 (a)** Complete the **two** empty boxes in the table.

| Symbol | Element | Number of atoms in the formula $CaCO_3$ |
|---|---|---|
| Ca | calcium | 1 |
| C | carbon | ..... |
| O | oxygen | ..... |

*(2 marks)*

**2 (b)** The diagram shows a lime kiln.
A lime kiln is used to heat limestone to make quicklime.



Use the diagram to help you to answer these questions.

**2 (b) (i)** Draw a line from each substance to the name of the main chemical(s) that the substance contains.

| Substance | Name of the main chemical(s) |
|---|---|
| air | nitrogen and oxygen |
| quicklime | calcium oxide |
| waste gases | nitrogen and carbon dioxide |
| | calcium carbonate |
| | methane |

*(3 marks)*

**2 (b) (ii)** A mixture of methane and air is used in the lime kiln.

Explain why.

.....

.....

.....

.....

*(2 marks)*

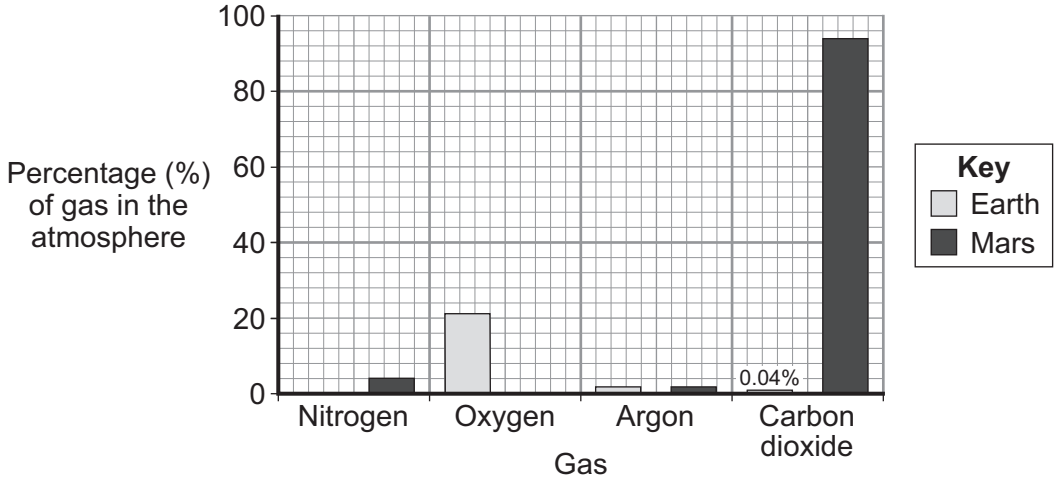
**2 (c)** Tick (✓) **two** uses of limestone.

| Use of limestone | Tick (✓) |
|---|---|
| as a building material | |
| to make poly(ethene) | |
| as a fuel | |
| to make cement | |

*(2 marks)*

9

**3** The bar chart shows some of the gases in the atmospheres of Earth today and Mars today.




**3 (a)** Complete the bar chart to show the percentage of nitrogen in the Earth's atmosphere today.

*(1 mark)*

**3 (b)** Some scientists suggest that the Earth's early atmosphere was like the atmosphere of Mars today.

**3 (b) (i)** There is **not** much oxygen in the atmosphere of Mars.

Suggest why.

.....

.....

*(1 mark)*

**3 (b) (ii)** The percentage of argon in the Earth's atmosphere today is the same as it was in the Earth's early atmosphere.

Suggest why.

.....

.....

*(1 mark)*

**3 (c)** Compared with the percentage of carbon dioxide in the Earth's early atmosphere there is **not** much carbon dioxide in the Earth's atmosphere today.

Give **one** reason for this change.

.....

.....

*(1 mark)*

**3 (d)** Draw a ring around the correct answer to complete the sentence.

Some theories suggest that the Earth's early atmosphere was

made by

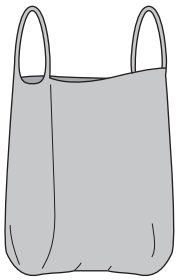
- burning fossil fuels.
- the formation of oceans.
- the eruption of volcanoes.

*(1 mark)*

5

**Turn over for the next question**

**4** The plastic used for shopping bags is made from crude oil.



**4 (a)** Complete each sentence.

**4 (a) (i)** The compounds of hydrogen and carbon

in crude oil are called ..... .

*(1 mark)*

**4 (a) (ii)** Crude oil is separated into fractions, such as naphtha, using

fractional ..... .

*(1 mark)*

**4 (b)** Plastics are made from alkenes.
The alkenes are made from naphtha.

Draw a ring around the correct answer to complete each sentence.

**4 (b) (i)** First the liquid naphtha is made into a gas. This process is called

distilling.

filtering.

vaporising.

*(1 mark)*

**4 (b) (ii)** The naphtha gas is then passed over a hot catalyst.

This process is called

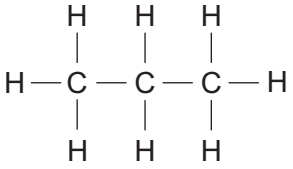
boiling.

bonding.

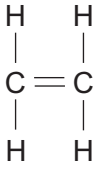
cracking.

*(1 mark)*

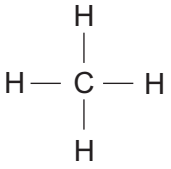
**4 (c)** The displayed formulas of three molecules are:



**Molecule A**



**Molecule B**



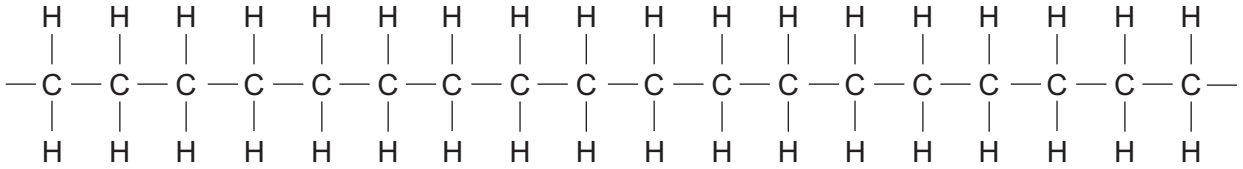
**Molecule C**

Which molecule, **A**, **B** or **C**, is an alkene? ☐

*(1 mark)*

**4 (d)** The plastic for the bag is made when many alkene molecules are joined together to make the polymer called poly(ethene).

Part of a very large poly(ethene) molecule is shown below.



After plastic bags have been used for shopping, the bags can be reused, recycled, buried in landfill sites or burned.

**4 (d) (i)** Reusing and recycling used plastic bags is good for the environment because this conserves crude oil.

Tick (✓) another reason why recycling used plastic bags is good for the environment.

| Reason | Tick (✓) |
|---|---|
| energy is used to transport and melt the used plastic bags | |
| new plastic products are made from the used plastic bags | |
| new plastic bags made from crude oil are cheap to produce | |

*(1 mark)*

**Question 4 continues on the next page**

**4 (d) (ii)** Complete the sentence.

One reason why burying used plastic bags in landfill sites is not good for the environment is that poly(ethene) ..... .

*(1 mark)*

**4 (d) (iii)** Some statements about burning used plastic bags are given below.

Tick (✓) **one** advantage and tick (✓) **one** disadvantage of burning used plastic bags.

| | **Advantage Tick (✓)** | **Disadvantage Tick (✓)** |
|---|---|---|
| new plastic bags can be produced | | |
| carbon dioxide is produced | | |
| water is one of the products | | |
| energy is released | | |

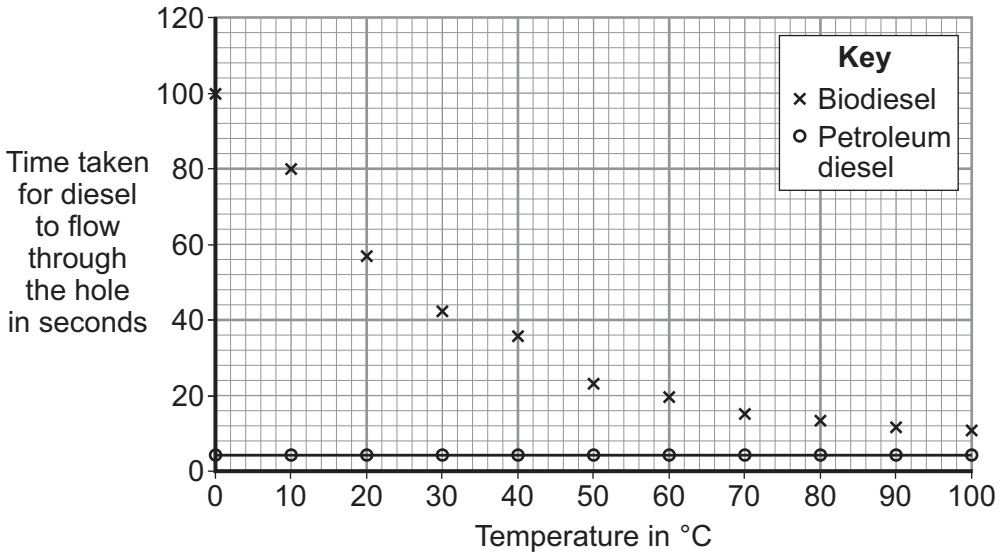
*(2 marks)*

9

**5** There are two main types of diesel fuel used for cars:

- biodiesel, made from vegetable oils
- petroleum diesel, made from crude oil.

**5 (a)** A scientist compared the viscosity of biodiesel with petroleum diesel at different temperatures.
The scientist measured the time for the same volume of diesel to flow through a small hole in a cup.
The scientist's results are plotted on the grid.




**5 (a) (i)** Draw a line of best fit for the biodiesel results.

*(1 mark)*

**5 (a) (ii)** What conclusions can the scientist make about the viscosity of biodiesel compared with the viscosity of petroleum diesel at different temperatures?

.....

.....

.....

.....

*(2 marks)*

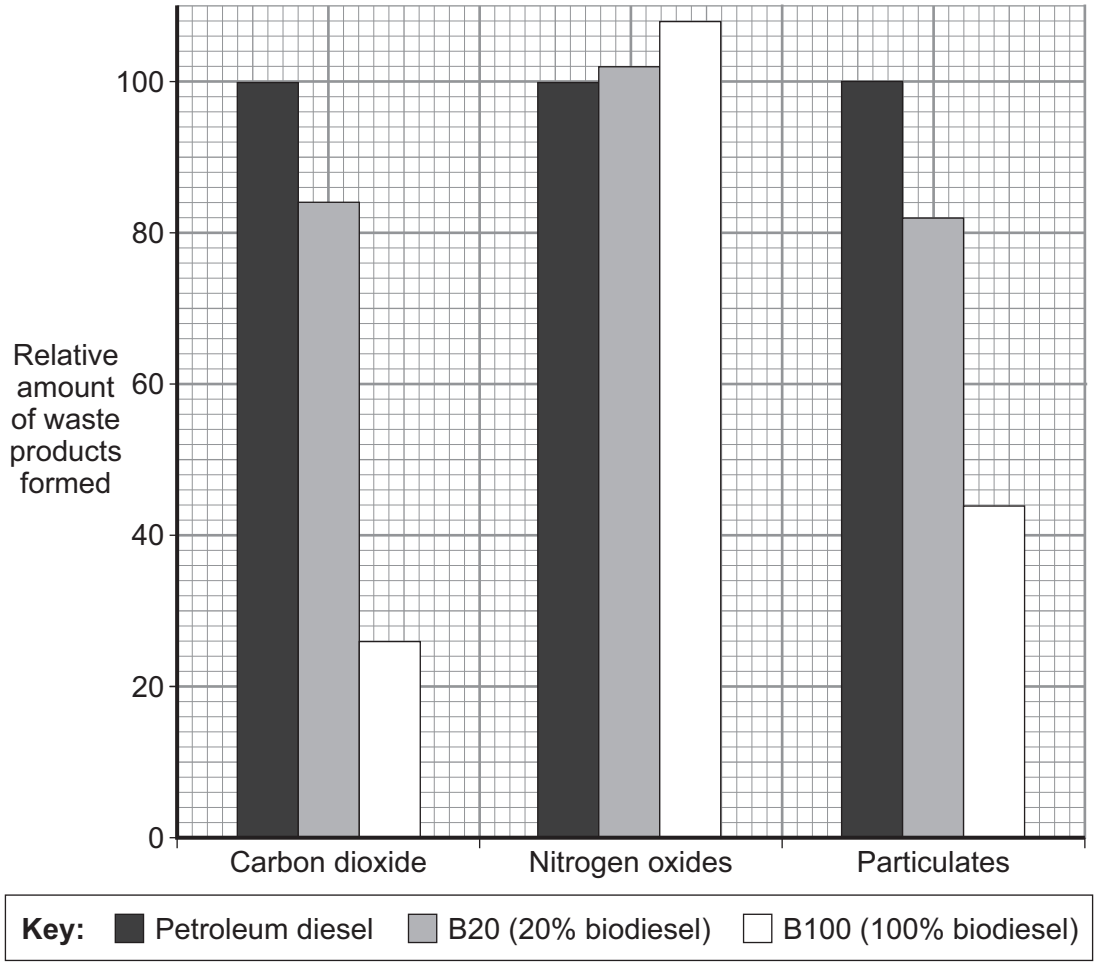
**5 (a) (iii)** Biodiesel may be less suitable than petroleum diesel as a fuel for cars.
Use these results to suggest **one** reason why.

.....

.....

*(1 mark)*

**5 (b)** Biodiesel can be mixed with petroleum diesel to make a fuel for cars.
In a car engine, the diesel fuel burns in air.
The waste products leave the car engine through the car exhaust system.
The bar chart compares the relative amounts of waste products made when three different types of diesel fuel burn in a car engine.




Nitrogen oxides and sulfur dioxide cause a similar environmental impact.

**5 (b) (i)** What environmental impact do particulates from car exhaust systems cause?

.....

*(1 mark)*

**5 (b) (ii)** What is the percentage reduction in particulates when using B100 instead of petroleum diesel?

..... %

*(1 mark)*

**5 (b) (iii)** Replacing petroleum diesel with biodiesel increases one type of environmental pollution.

Use the bar chart and the information given to explain why.

.....

.....

.....

.....

*(2 marks)*

**5 (b) (iv)** A carbon neutral fuel does **not** add extra carbon dioxide to the atmosphere.

Is biodiesel a carbon neutral fuel?

Use the bar chart and your knowledge to explain your answer.

.....

.....

.....

.....

*(2 marks)*

**10**

**Turn over for the next question**

**6** Read the article.

## Problem food colourings

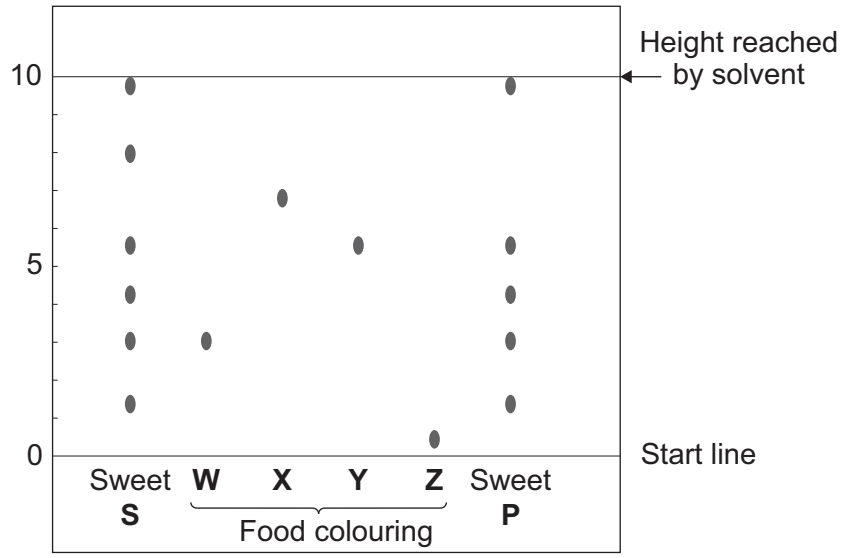
Scientists say they have evidence that some food colourings cause hyperactive behaviour in young children.

These food colourings are added to some sweets.

**W**, **X**, **Y** and **Z** are food colourings that may cause hyperactive behaviour in young children.

A scientist used chromatography to see if these food colourings were used in two sweets, **S** and **P**.

The results are shown on the chromatogram.



**6 (a)** Food colourings, such as **W**, **X**, **Y** and **Z**, are added to some sweets.

Suggest **one** reason why.

.....

.....

*(1 mark)*

**6 (b)** In chromatography, the $R_f$ value = $\frac{\text{distance moved by the colouring}}{\text{distance moved by the solvent}}$

Use the scale on the chromatogram to help you to answer this question.

Which food colouring, **W**, **X**, **Y** or **Z**, has an $R_f$ value of 0.7?

*(1 mark)*

**6 (c)** From the chromatogram, what conclusions can the scientist make about the colourings in sweets **S** and **P**?

.....

.....

.....

.....

.....

.....

.....

.....

.....

*(3 marks)*

**5**

**END OF QUESTIONS**

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

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