AQA GCSE CHEMISTRY (4421)

CHEMISTRY



EXAM QUESTION PACK

UNIT C1 FOUNDATION TIER CHY1F PAPERS

STEMUP

These questions belong to AQA, not to us.

The examination questions, mark schemes and examiner reports in this pack were written and published by AQA. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with AQA and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. AQA has not endorsed, approved or been involved in the production of it. AQA and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

AQA publishes its past papers, mark schemes and examiner reports free of charge. Always check the current specification at aqa.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

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.

STEMUP.CO.UK

Do not write outside the box

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

1 Iron is extracted from its ore.

1 (a) Iron ore is quarried.



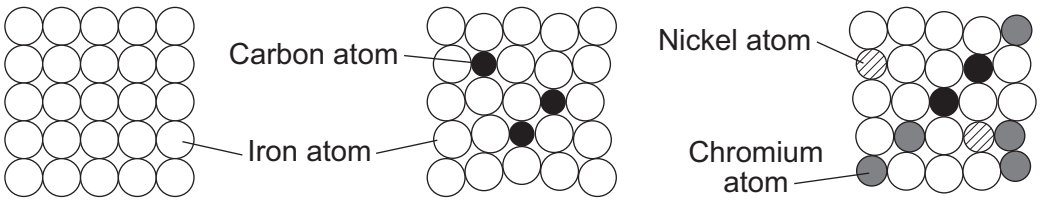
Quarrying iron ore has impacts that cause environmental problems.

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**

Do not write outside the box

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

Do not write outside the box

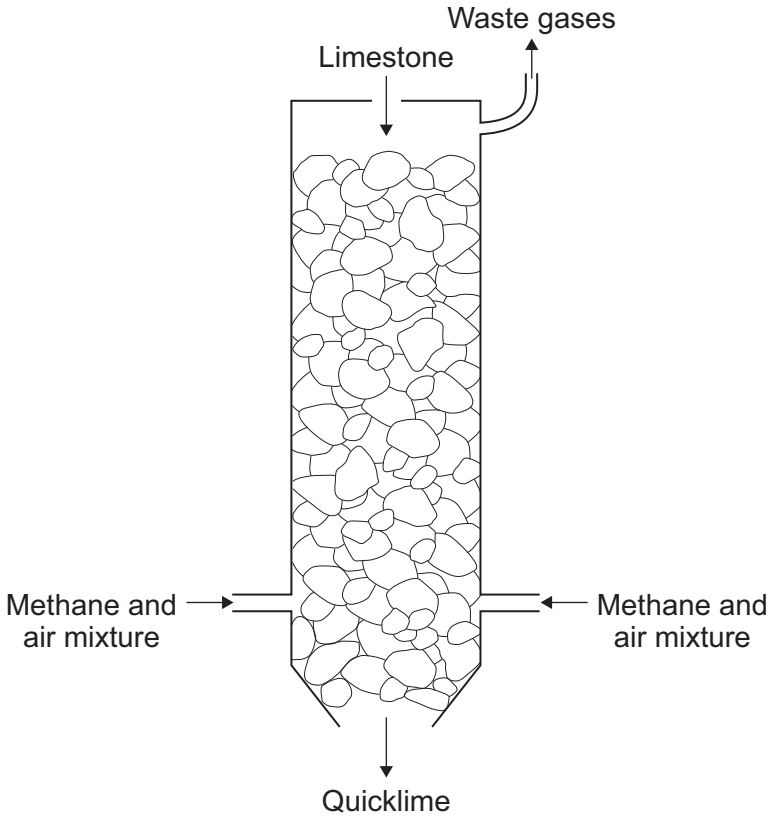
2 Limestone is mainly calcium carbonate, $CaCO_3$

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.



Do not write outside the box

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	

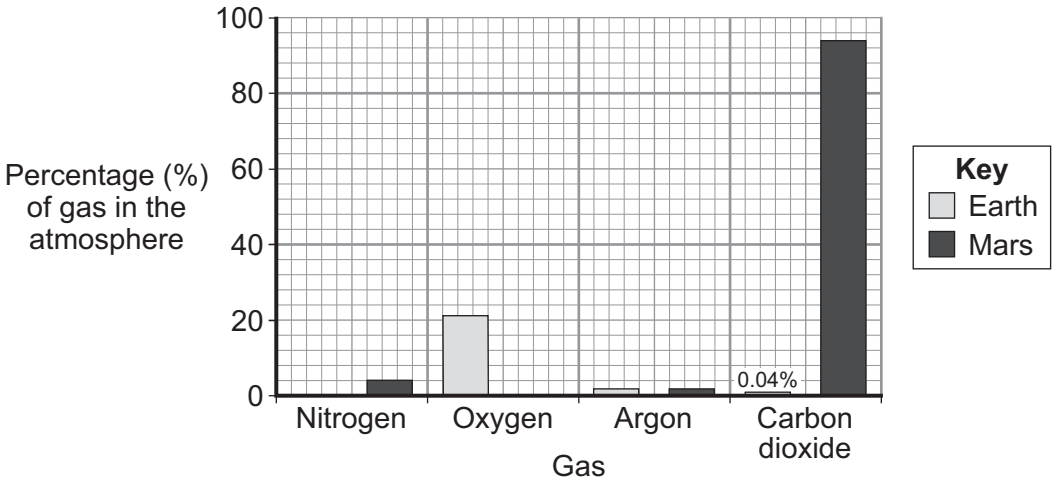
(2 marks)

9

Turn over ▶

Do not write outside the box

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)

Do not write outside the box

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.

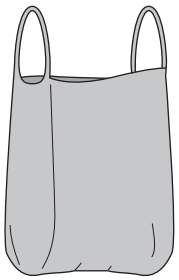
(1 mark)

5

Turn over for the next question

Do not write outside the box

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.

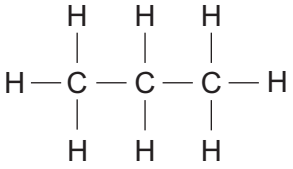
bonding.

cracking.

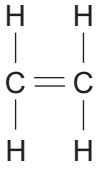
(1 mark)

Do not write outside the box

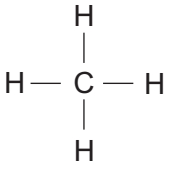
4 (c) The displayed formulas of three molecules are:



Molecule A



Molecule B



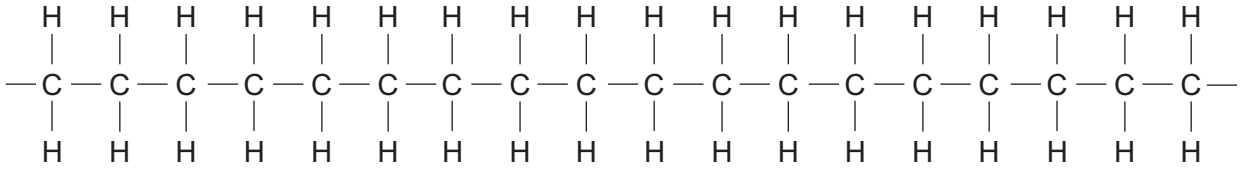
Molecule C

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

Do not write outside the box

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)

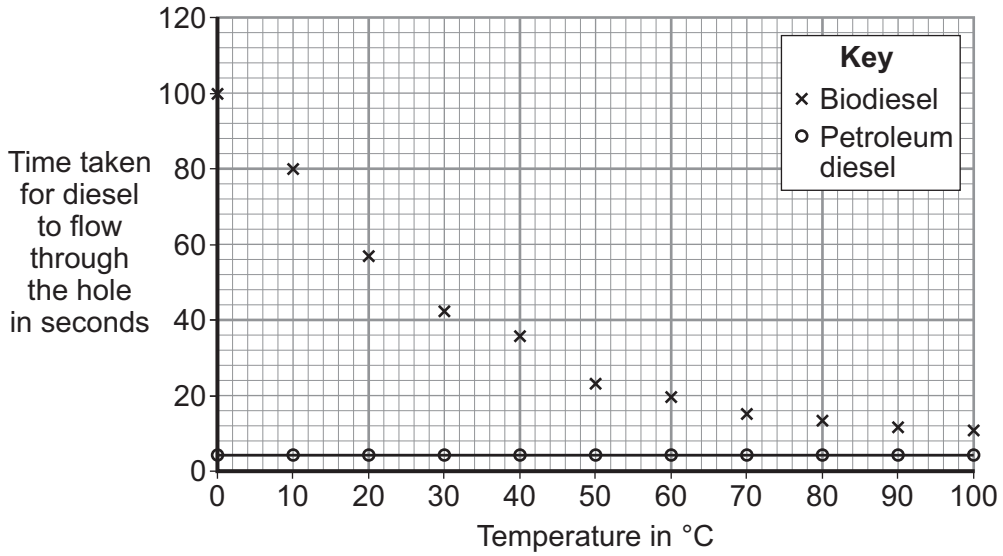
9

Do not write outside the box

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.

.....

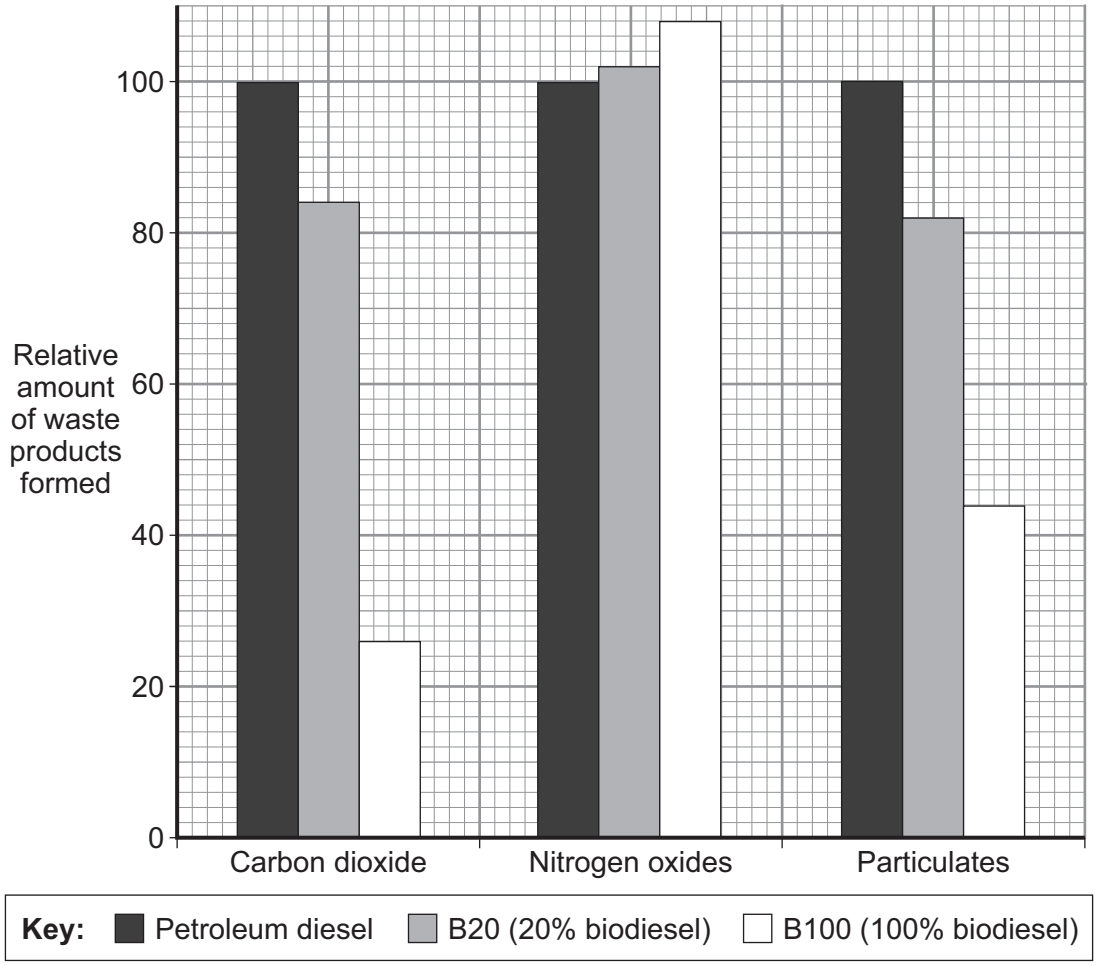
.....

(1 mark)

Turn over ▶

Do not write outside the box

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)

Do not write outside the box

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

Do not write outside the box

6 Read the article.

Problem food colourings

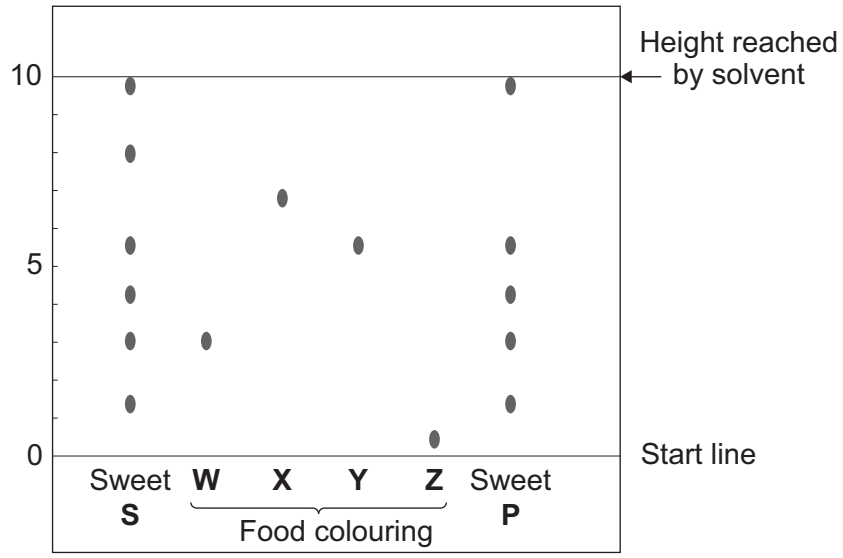
Scientists say they have evidence that some food colourings cause hyperactive behaviour in young children.

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.



Do not write outside the box

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

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

Question 1 Photograph © Thinkstock

Copyright © 2012 AQA and its licensors. All rights reserved.

Version : 10/08/2012

General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Mark Scheme

2012 examination – June series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2012 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered schools / colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools / colleges to photocopy any material that is acknowledged to a third party even for internal use within the school / college.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

CHY1F

Question 1

question	answers	extra information	mark
1(a)	causes dust pollution increases traffic		1 1
1(b)(i)	it is soft	accept the layers of atoms can slide over each other ignore other properties	1
1(b)(ii)	contains chromium / nickel	allow contains other metals	1
1(c)(i)	an element		1
1(c)(ii)	hard		1
1(c)(iii)	is resistant to corrosion		1
Total			**7**

STEMUP.CO.UK

CHY1F

Question 2

question	answers	extra information	mark
2(a)	1 / one		1
	3 / three		1
2(b)(i)	air linked to nitrogen and oxygen		1
	quicklime linked to calcium oxide		1
	waste gases linked to nitrogen and carbon dioxide		1
2(b)(ii)	mixture burns / combusts	accept methane reacts with air / oxygen accept as a fuel	1
	to provide energy / heat		1
2(c)	as a building material		1
	to make cement		1
Total			**9**

STEMUP.CO.UK

CHY1F

Question 3

question	answers	extra information	mark
3(a)	bar drawn correctly 78 – 80 (%)		1
3(b)(i)	(Mars has) no (green / living) plants / trees		1
3(b)(ii)	(argon) is unreactive / inert	accept argon is a noble gas ignore it is in Group 0	1
3(c)	(the amount of carbon dioxide has decreased because it has been) absorbed / used by (green / living) plants / trees **or** used for photosynthesis	accept dissolved / absorbed by oceans or locked up in fossil fuels / carbonate rocks	1
3(d)	the eruption of volcanoes		1
Total			**5**

STEMUP.CO.UK

CHY1F

Question 4

question	answers	extra information	mark
4(a)(i)	hydrocarbons	accept alkanes	1
4(a)(ii)	distillation		1
4(b)(i)	vaporising		1
4(b)(ii)	cracking		1
4(c)	B		1
4(d)(i)	new plastic products are made from the used plastic bags		1
4(d)(ii)	not biodegradable	accept does not decompose allow does not rot	1
4(d)(iii)	advantage – energy is released disadvantage – carbon dioxide is produced		1 1
Total			**9**

STEMUP.CO.UK

CHY1F

Question 5

question	answers	extra information	mark
5(a)(i)	a reasonable attempt at a smooth curve	allow a curve which is close to but does not necessarily touch all points	1
5(a)(ii)	any **two** from: • biodiesel is more viscous than petroleum diesel at all / lower temperatures • biodiesel – as the temperature increases the viscosity decreases or vice versa • petroleum diesel – the viscosity does not change	allow thicker / thinner / runny for viscous if no other mark awarded allow **1** mark for any correct conclusion based on time or rate of flow	2
5(a)(iii)	does not flow as easily (through pipes / engine) **or** needs a high temperature to flow	allow could form a solid / block pipes / engine at low temperatures allow more difficult to vaporise / ignite ignore burning ignore references to viscosity	1
5(b)(i)	global dimming	allow correct description	1
5(b)(ii)	56 (%)		1

Question 5 continues on the next page . . .

STEMUP.CO.UK

CHY1F

Question 5 cont'd…

question	answers	extra information	mark
5(b)(iii)	(increases) acid rain		1
	because there is more nitrogen oxide(s)	ignore sulfur dioxide if no other mark awarded allow **1** mark for nitrogen oxide(s) given	1
5(b)(iv)		answer yes or no does not gain credit because the marks are for an explanation ignore references to petroleum diesel allow carbon for carbon dioxide	
	no because carbon dioxide (26%) is released / produced		1
	this will not all be absorbed by photosynthesis / growing plants for biodiesel	accept growing plants / farming uses machinery / fossil fuels releases carbon dioxide	1
	OR yes because although carbon dioxide (26%) is released / produced (1)		
	this was absorbed by photosynthesis / growing plants(for biodiesel) (1)	allow this will be absorbed by photosynthesis / growing plants for biodiesel	
Total			**10**

STEMUP.CO.UK

CHY1F

Question 6

question	answers	extra information	mark
6(a)	(improve) appearance	allow add colour allow these food colourings have not been proven to cause hyperactive behaviour in young children do **not** accept taste / flavour / preservatives ignore reference to E-numbers	1
6(b)	X		1
6(c)	any **three** from: • S contains six / 6 colourings • P contains five / 5 colourings • both S and P contain the same five / 5 colourings • both contain W **and** Y • both sweets (may) cause hyperactivity • neither contain X **and** Z	if neither of first 2 bullet points given allow **1** mark for S contains more colours than P **or** converse ignore unsafe	3
Total			**5**

UMS Conversion Calculator www.aqa.org.uk/umconversion

STEMUP.CO.UK

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

General Certificate of Secondary Education
Foundation Tier
January 2012

Science B
Unit Chemistry C1

CHY1F

F

Chemistry
Unit Chemistry C1

Written Paper

Thursday 26 January 2012 9.00 am to 9.45 am

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.

STEMUP.CO.UK

Do not write outside the box

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

1 This question is about atoms and molecules.

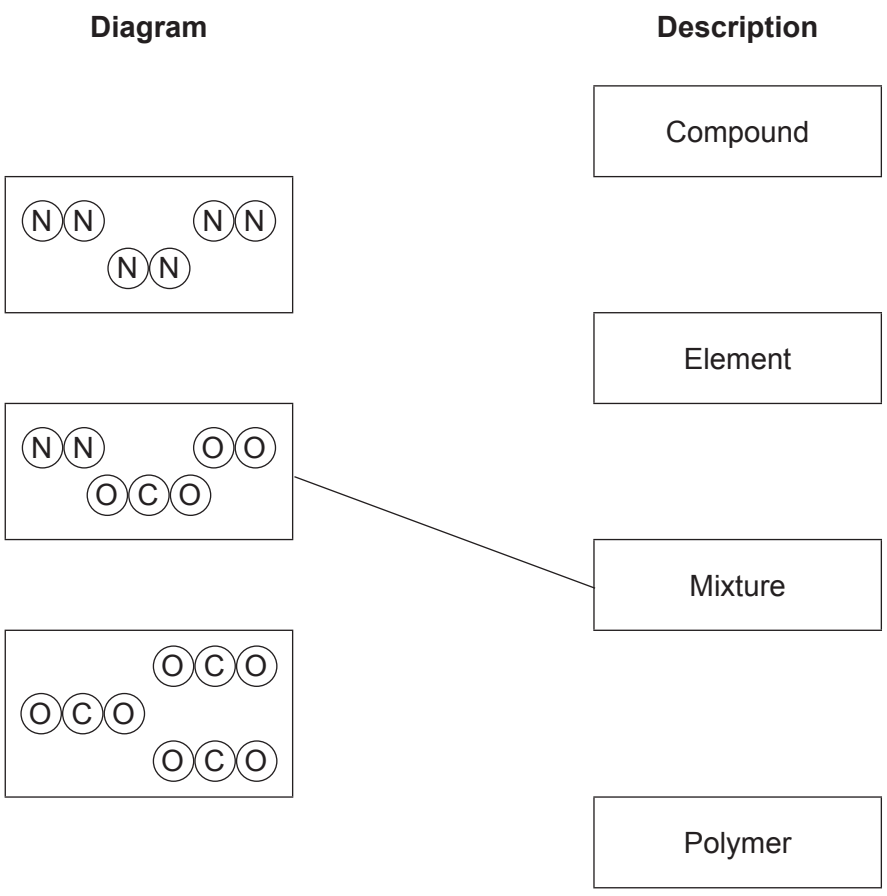
1 (a) In the diagrams below:

(N) is a nitrogen atom

(O) is an oxygen atom

(C) is a carbon atom.

Draw **one** line from each diagram to its correct description.
One line has been done for you.

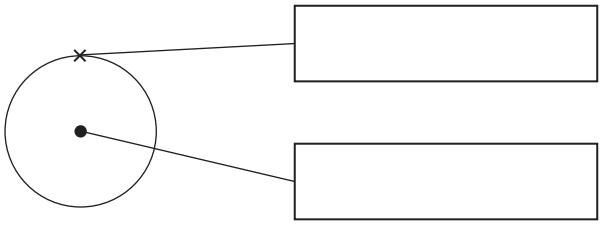


(2 marks)

Do not write outside the box

1 (b) The diagram below shows a hydrogen atom.
Use words from the box to write the correct labels on the diagram.

alloy	**electron**	**group**	**nucleus**



(2 marks)

1 (c) This chemical equation represents the reaction of hydrogen burning.

$$2\,H_2 \quad + \quad O_2 \quad \rightarrow \quad 2\,H_2O$$

Complete the sentence to describe what is happening in this chemical reaction.

Hydrogen reacts with .....

.....

.....

.....

(2 marks)

6

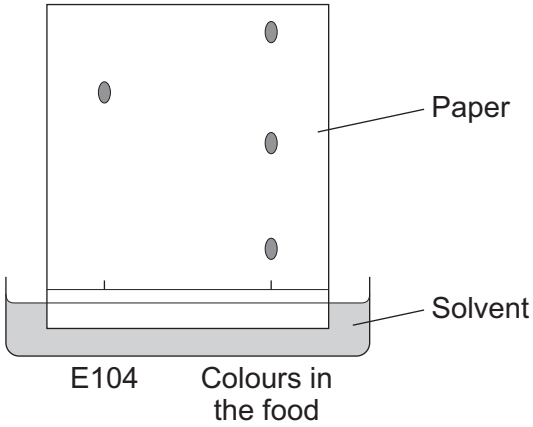
Turn over for the next question

Do not write outside the box

2 An article began:

> **Ban yellow additives**
>
> Quinoline yellow (E104) is suspected of causing hyperactivity, asthma and rashes in children.

2 (a) A student tested a food to find out if it contained quinoline yellow (E104). The student's results are shown below.



2 (a) (i) Draw a ring around the correct answer to complete the sentence.

This method of detecting and identifying colours is called

chromatography.

distillation.

electrolysis.

(1 mark)

2 (a) (ii) Using the student's results, how many different colours are in the food? .....

(1 mark)

2 (a) (iii) Using the student's results, how can you tell that the food does **not** contain quinoline yellow (E104)?

.....

.....

(1 mark)

Do not write outside the box

2 (b) Quinoline yellow (E104) is used in foods such as sweets, drinks and ice cream.

2 (b) (i) Give **one** reason why quinoline yellow (E104) is added to foods.

.....

.....

(1 mark)

2 (b) (ii) Suggest what should be done to decide if quinoline yellow (E104) should be banned.

.....

.....

(1 mark)

5

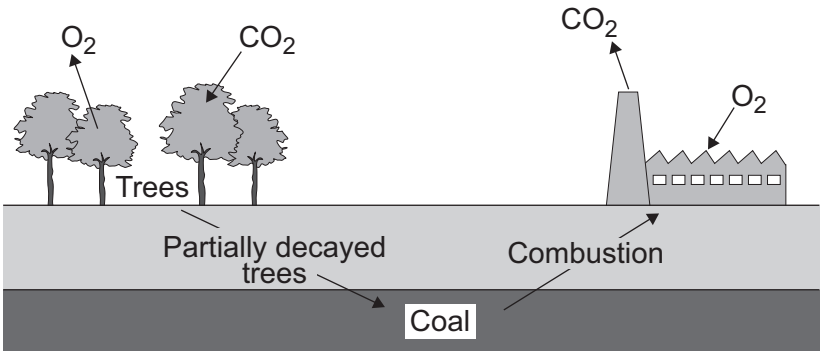
Turn over for the next question

Do not write outside the box

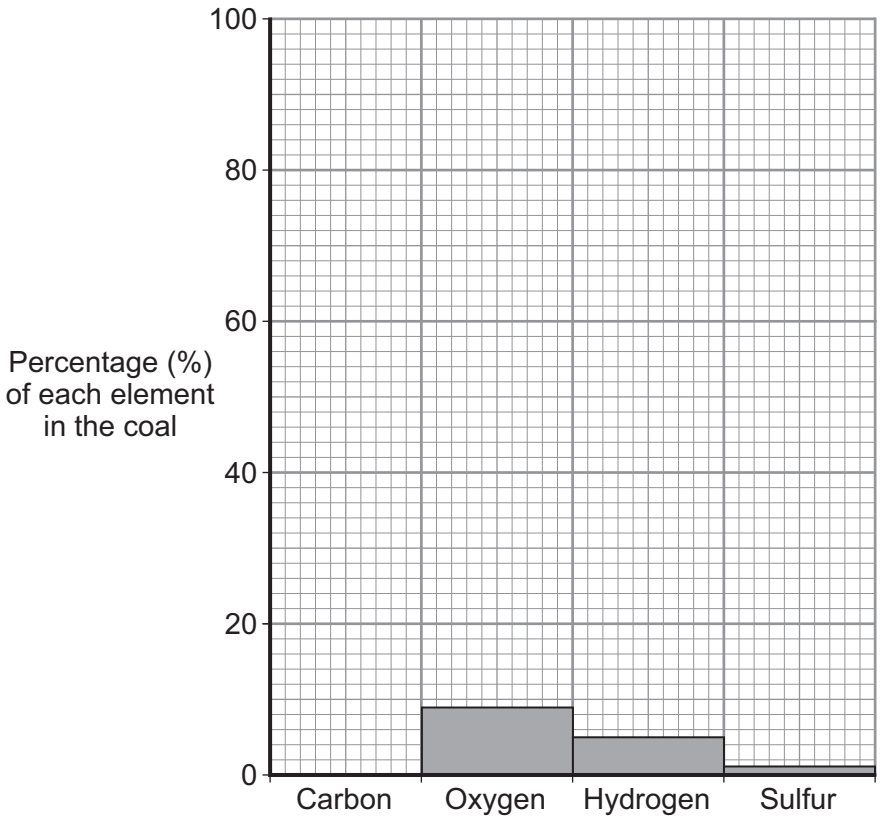
3 About 3000 million years ago carbon dioxide was one of the main gases in the Earth's early atmosphere.

About 400 million years ago plants and trees grew on most of the land. When the plants and trees died they were covered by sand and slowly decayed to form coal.

Today coal is burned in power stations to release the energy needed by industry.



3 (a) The bar chart shows the percentage of some of the elements in this coal.



3 (a) (i) This coal contains 85 % carbon. Draw the bar for carbon on the chart.

(1 mark)

Do not write outside the box

3 (a) (ii) Coal is burned in the atmosphere to release energy.
Two of the products of burning coal are shown.

Draw **one** line from each product to its environmental impact.

Product	Environmental impact
Sulfur dioxide	Acid rain
Carbon particles	Global dimming
	Global warming

(2 marks)

3 (b) Use the information above and your knowledge and understanding to answer these questions.

3 (b) (i) How did the formation of coal decrease the amount of carbon dioxide in the Earth's early atmosphere?

.....

.....

(1 mark)

3 (b) (ii) How does burning coal affect the amount of carbon dioxide in the Earth's atmosphere? Explain your answer.

.....

.....

.....

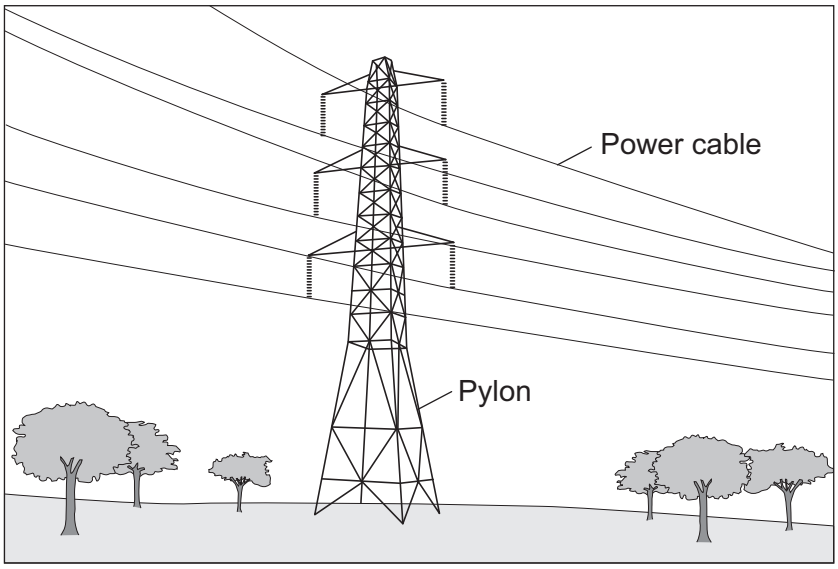
.....

(2 marks)

6

Do not write outside the box

4 Metals are used in the manufacture of pylons and overhead power cables.



4 (a) Suggest **one** reason why iron (steel) is used to make pylons.

.....

.....

(1 mark)

4 (b) The table shows some of the properties of two metals.

Metal	Density in g per cm^3	Melting point in °C	Percentage(%) relative electrical conductivity	Percentage(%) abundance in Earth's crust
copper	8.92	1083	100	0.007
aluminium	2.70	660	60	8.1

Use the information in the table to suggest why aluminium and **not** copper is used to conduct electricity in overhead power cables.

.....

.....

.....

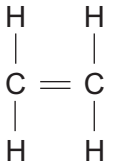
.....

(2 marks)

Do not write outside the box

4 (c) A polymer can be used to cover and insulate power cables.

The polymer is made from the alkene:



Draw a ring around the correct answer to complete each of the sentences.

4 (c) (i) The chemical formula of this alkene is

CH

CH_4

C_2H_4

(1 mark)

4 (c) (ii) The two lines between the carbon atoms are called a

double bond.

nucleus.

single bond.

(1 mark)

4 (c) (iii) The name of the polymer formed when many of these alkene molecules join together

is

poly(ethene).

poly(ethenol).

poly(propene).

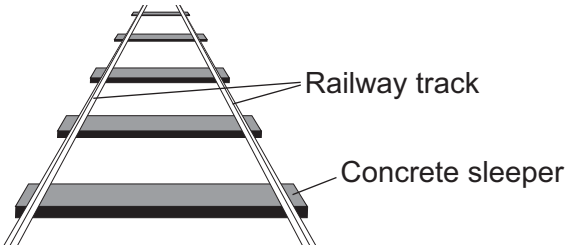
(1 mark)

6

Turn over for the next question

Do not write outside the box

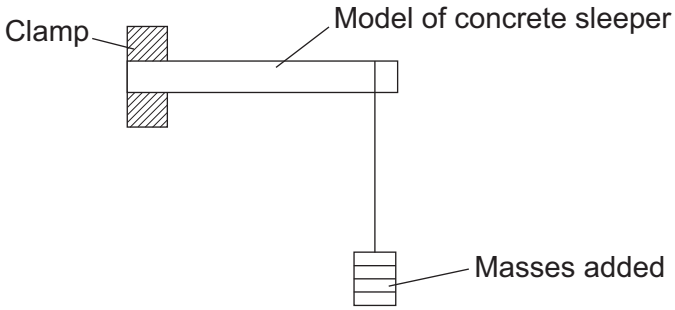
5 In the UK, railway sleepers are often made from concrete.



A scientist was asked to find the best concrete mixture to use so that railway sleepers would not break easily.

The scientist made:

- a mould to make small models of concrete sleepers
- concrete mixtures using crushed rock, sand, cement and water
- the equipment shown to add 0.1 kg masses until the model sleeper broke.



The scientist's results are shown in the table.

Concrete mixture in % by volume			Total mass added to break the model sleeper in kg			
Cement	**Sand**	**Crushed rock**	**Test 1**	**Test 2**	**Test 3**	**Mean**
10	70	20	1.1	1.3	1.2	1.2
20	60	20	2.6	2.5	2.4	
30	50	20	3.3	3.3	3.3	3.3
40	40	20	3.8	4.0	3.3	3.9
50	30	20	4.5	4.2	4.3	4.3

Do not write outside the box

5 (a) (i) Calculate the mean total mass added to break the model sleeper that has 20 % cement by volume.

.....

Mean = ... kg

(1 mark)

5 (a) (ii) Choose **one** result in the table that the scientist should check and test again.

Result: % cement by volume ..... Test number .....

Explain why you chose this result.

.....

.....

(2 marks)

5 (a) (iii) What is the relationship between the total mass to break the model sleeper and the percentage (%) of cement by volume in the concrete mixture?

.....

.....

(1 mark)

5 (a) (iv) Suggest **one** other variable that the scientist should have recorded in the table of results.

.....

(1 mark)

5 (b) The scientist thought that full-size railway sleepers should be made from 30 % cement, 50 % sand and 20 % crushed rock.

What other information about these three materials is needed before the scientist recommends using this mixture to make a full-size railway sleeper?

.....

.....

.....

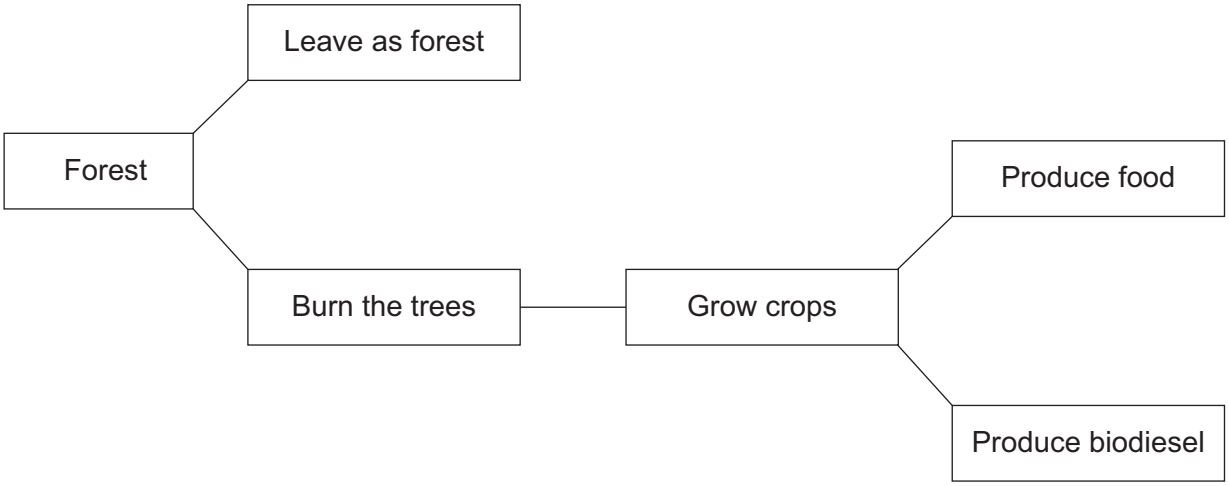
.....

(2 marks)

7

Do not write outside the box

6 Petroleum diesel is a fuel made from crude oil.
Biodiesel is a fuel made from vegetable oils.
To make biodiesel, large areas of land are needed to grow crops from which the vegetable oils are extracted.
Large areas of forest are cleared by burning the trees to provide more land for growing these crops.



6 (a) Use this information and your knowledge and understanding to answer these questions.

6 (a) (i) Carbon neutral means that there is no increase in the amount of carbon dioxide in the atmosphere.

Suggest why adverts claim that using biodiesel is carbon neutral.

.....

.....

.....

.....

.....

.....

(2 marks)

Do not write outside the box

6 (a) (ii) Explain why clearing large areas of forest has an environmental impact on the atmosphere.

.....

.....

.....

.....

.....

.....

(2 marks)

6 (b) Why is there an increasing demand for biodiesel?

.....

.....

(1 mark)

6 (c) Suggest why producing biodiesel from crops:

6 (c) (i) causes ethical concerns

.....

.....

(1 mark)

6 (c) (ii) causes economic concerns.

.....

.....

(1 mark)

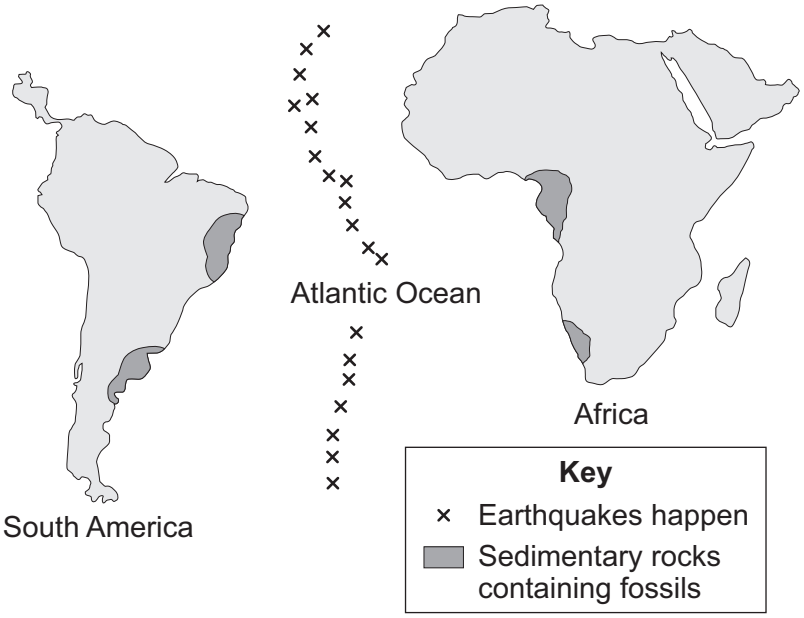
7

Turn over for the next question

Do not write outside the box

7 Earthquakes happen in some places on Earth.

The diagram shows some of these places that are between the continents of South America and Africa.



7 (a) (i) Why do earthquakes happen in the places shown on the diagram?

.....

.....

(1 mark)

7 (a) (ii) Scientists cannot predict when earthquakes will happen.
Suggest why.

.....

.....

.....

(1 mark)

Do not write outside the box

7 (b) In 1915, Alfred Wegener proposed the idea of continental drift.
He suggested that South America and Africa had once been joined.
Most scientists in 1915 did not accept his idea.

7 (b) (i) In 1915, Wegener's idea was **not** accepted by most scientists.
Suggest **one** reason why.

.....

.....

(1 mark)

7 (b) (ii) Use the information in the diagram to suggest **two** pieces of evidence that led to Wegener's idea being accepted by most scientists.

.....

.....

.....

.....

.....

.....

(2 marks)

7 (c) Explain, in as much detail as you can, what is causing the continents of South America and Africa to move further apart.

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)

8

END OF QUESTIONS

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright © 2012 AQA and its licensors. All rights reserved.

Version : 07/03/2012

General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Mark Scheme

2012 examination – January series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2012 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered schools / colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools / colleges to photocopy any material that is acknowledged to a third party even for internal use within the school / college.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

CHY1F

Question 1

question	answers	extra information	mark
1(a)	NN linked to element OCO linked to compound		1 1
1(b)	electron nucleus	must be correct order	1 1
1(c)	(reacts with) oxygen to produce water	must be names accept hydrogen oxide allow steam	1 1
Total			**6**

STEMUP.CO.UK

CHY1F

Question 2

question	answers	extra information	mark
2(a)(i)	chromatography		1
2(a)(ii)	3 / three		1
2(a)(iii)	the colour / E104 is not on the same level as any of the colours in the food	accept E104 does not match	1
2(b)(i)	to improve the appearance of the food	ignore adds yellow / colour ignore taste / flavour	1
2(b)(ii)	further / or different tests (for harmful effects) **or** obtain more evidence (that it is harmful)	allow do a survey / study	1
Total			**5**

STEMUP.CO.UK

CHY1F

Question 3

question	answers	extra information	mark
3(a)(i)	bar drawn between 84 and 86		1
3(a)(ii)	sulfur dioxide linked to acid rain carbon particles linked to global dimming		1 1
3(b)(i)	any **one** from: • plants / trees absorb (carbon dioxide) • coal 'locks up' (carbon dioxide)		1
3(b)(ii)	it increases the amount (of CO_2) because carbon in coal (forms carbon dioxide)	 accept because carbon / coal burns / reacts with oxygen (to produce CO_2)	1 1
Total			**6**

STEMUP.CO.UK

CHY1F

Question 4

question	answers	extra information	mark
4(a)	(iron (steel) is) strong	allow abundant **or** easy to extract **or** cheap ignore other correct properties	1
4(b)	less dense more abundant	allow low mass accept copper is 'running out' allow copper is more expensive ignore other correct statements	1 1
4(c)(i)	C_2H_4		1
4(c)(ii)	double bond		1
4(c)(iii)	poly(ethene)		1
Total			**6**

STEMUP.CO.UK

CHY1F

Question 5

question	answers	extra information	mark
5(a)(i)	2.5(kg)	ignore units	1
5(a)(ii)	40% (cement) **and** Test 3 because it is anomalous or because it is much lower than the other two readings	ignore units accept value not used to calculate mean ignore outlier	1 1
5(a)(iii)	as the percentage of cement increases the mass needed to break the sleeper increases	allow 'strength for 'mass needed' allow correct relationship using percentage of sand	1
5(a)(iv)	volume/percentage / amount of water	accept temperature	1
5(b)	any **two** from: • availability (of the raw materials) • cost of the raw materials • purity (of the raw materials)		2
Total			**7**

STEMUP.CO.UK

CHY1F

Question 6

question	answers	extra information	mark
6(a)(i)		use of carbon throughout = **max 1**	
	burning biodiesel releases CO_2	ignore burning trees	1
	CO_2 is absorbed / used by the crops/plants (used to produce the biodiesel)	allow CO_2 absorbed / used by trees	1
6(a)(ii)		allow use of carbon for carbon dioxide throughout	
	increases CO_2 / greenhouse effect **OR** less CO_2 is absorbed (from atmosphere)	accept causes global warming allow causes climate change ignore other correct effects	1
	because burning trees releases CO_2 **OR** because there is less photosynthesis	accept fewer trees to absorb CO_2 **or** crops / plants do not absorb as much CO_2 as trees ignore habitats / biodiversity if no other mark awarded global dimming because of smoke / particles gains **1** mark	1
6(b)	any **one** from: • crude oil / fossil fuel is running out / non-renewable • demand for fuels / energy is increasing • new legislation / protocols	ignore carbon neutral / cost / less harmful / environmentally friendly allow biodiesel is renewable / sustainable ignore demand for biodiesel is increasing	1

Question 6 continues on the next page…….

STEMUP.CO.UK

Question 6 cont'd…..

question	answers	extra information	mark
6(c)(i)	uses crops / land that could be used for food	allow destroys habitats **or** reduces biodiversity ignore cost	1
6(c)(ii)	increases the cost of food / land	ignore cost of machinery / process ignore cheaper to produce biodiesel	1
Total			**7**

STEMUP.CO.UK

CHY1F

Question 7

question	answers	extra information	mark
7(a)(i)	plate boundary	allow plates moving / colliding allow fault line / sea floor spreading allow plate tectonics	1
7(a)(ii)	any **one** from: • do not know what happens below the Earth's crust • no pattern	 allow its underground allow random	1
7(b)(i)	any **one** from: • he could not explain how continents could move • other ideas existed (that continents were in fixed positions **or** there had been a land bridge)	 allow there was no evidence / no proof / did not know about plates allow it went against established ideas	1
7(b)(ii)	any **two** from: • similar fossils • similar rocks • jigsaw fit	accept in addition modern ideas such as sea floor spreading ignore plants / animals allow rocks match up allow reference to super continent / pangea	2
7(c)	(continents move) because there are convection currents in the mantle caused by radioactivity	 if no other mark awarded 'continents on different plates' gains **1** mark	1 1 1
Total			**8**

UMS Conversion Calculator www.aqa.org.uk/umconversion

STEMUP.CO.UK

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

General Certificate of Secondary Education
Foundation Tier
June 2011

Science B
Unit Chemistry C1

CHY1F

F

Chemistry
Unit Chemistry C1

Wednesday 15 June 2011 9.00 am to 9.45 am

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.

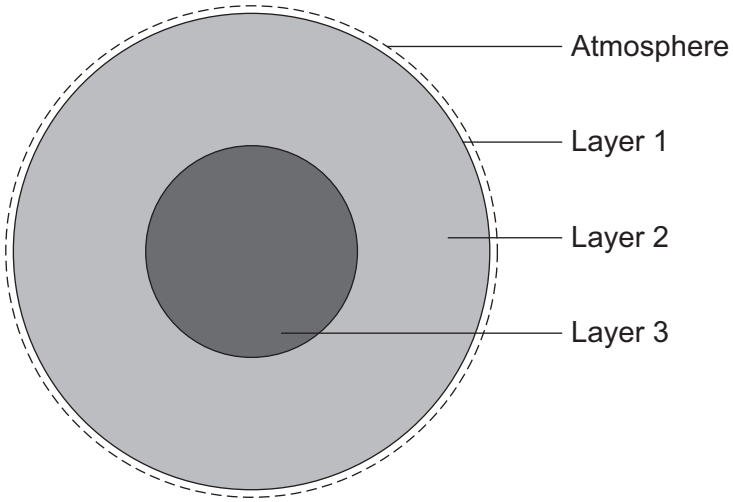
Advice
- In all calculations, show clearly how you work out your answer.

STEMUP.CO.UK

Do not write outside the box

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

1 The Earth is made up of several layers.



1 (a) Draw **one** straight line from each layer to its correct name.

Layer 1	core
Layer 2	crust
Layer 3	mantle
	nucleus

(3 marks)

Do not write outside the box

1 (b) The table shows the main gases in the Earth's atmosphere.

Gas	Percentage (%) in the atmosphere
Nitrogen	78.0
Oxygen	21.0
Argon	
Carbon dioxide	0.03

Use information in the table to help you to complete the sentences.

1 (b) (i) Draw a ring around the correct answer to complete the sentence.

The percentage of argon in the Earth's atmosphere is [0.97 / 9.7 / 97.0] %.

(1 mark)

1 (b) (ii) Complete the sentence.

The gas in the Earth's atmosphere that

is a compound is ..... .

(1 mark)

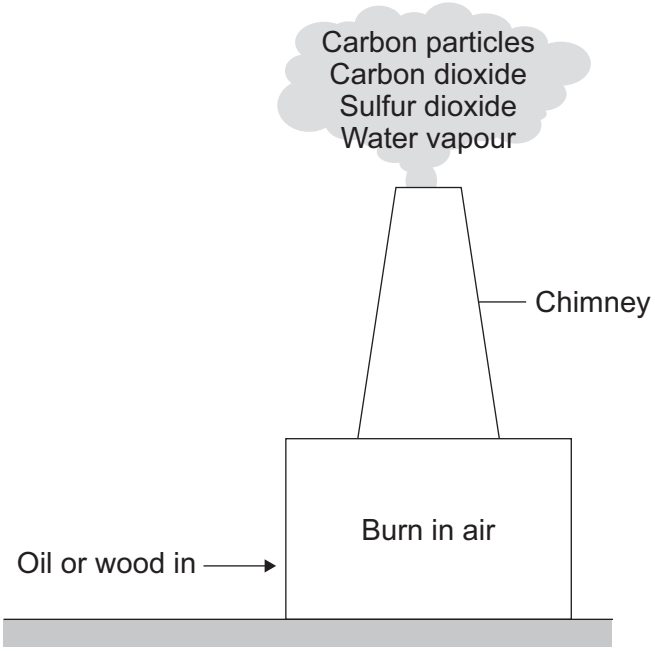
5

Turn over for the next question

Do not write outside the box

2 In the future:

- there will be fewer oil burning power stations
- there may be more wood burning power stations.



2 (a) Which **one** of the emissions from the chimney can cause acid rain?

.....

(1 mark)

2 (b) Draw a ring around the correct answer to complete the sentence.

Carbon particles in the Earth's atmosphere cause

acid rain.
global dimming.
global warming.

(1 mark)

2 (c) Which gas in the air is needed for oil or wood to burn?

.....

(1 mark)

2 (d) Suggest why there will be **fewer** power stations burning oil in the future.

.....

.....

(1 mark)

Do not write outside the box

2 (e) Some power stations burn wood.
The wood comes from trees grown in forests.

Suggest why burning wood in power stations is said to be 'carbon-neutral'.

.....

.....

.....

.....

(2 marks)

6

Turn over for the next question

Do not write outside the box

3 This is part of an article about food additives.

THE PERIL OF FOOD ADDITIVES

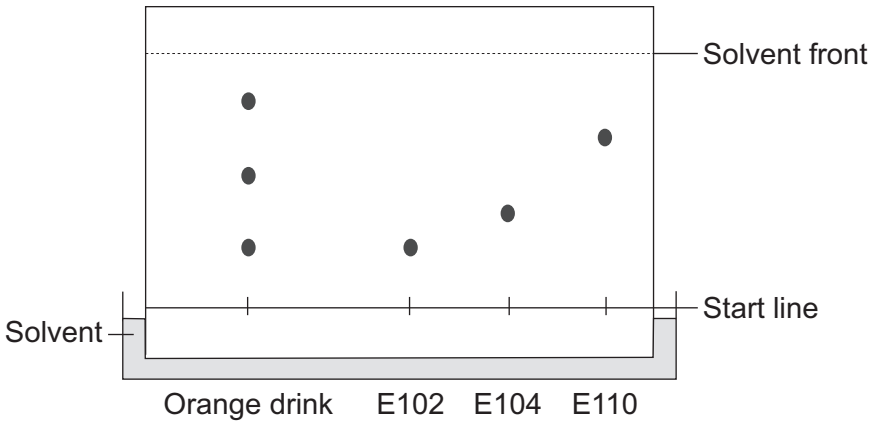
Some orange drinks contain the additives E102 (Tartrazine), E104 (Quinoline Yellow) and E110 (Sunset Yellow).
These three additives are thought to cause hyperactivity in children.

3 (a) Tick (✓) **two** reasons why a manufacturer of orange drinks uses these additives.

Reason	Tick (✓)
to make the drink healthier	
to improve the appearance of the drink	
because they are permitted colours	
because they are expensive	

(2 marks)

3 (b) A scientist tested an orange drink to find out if it contained these additives.
The result of the test is shown.



Do not write outside the box

3 (b) (i) Draw a ring around the correct answer to complete the sentence.

The test that the scientist did is called

chromatography.

cracking.

distillation.

(1 mark)

3 (b) (ii) How many coloured additives are there in the orange drink? .....

(1 mark)

3 (b) (iii) The scientist concluded that the orange drink contained only **one** of the additives E102, E104 and E110.

Explain why.

.....

.....

.....

.....

(2 marks)

6

Turn over for the next question

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

4 An ore contains zinc carbonate ($ZnCO_3$).

4 (a) Complete the table to show the number of atoms of each element in the formula of zinc carbonate.

Zinc has been done for you.

Element	Number of atoms in the formula $ZnCO_3$
Zinc, Zn	1
Carbon, C	
Oxygen, O	

(2 marks)

4 (b) Draw a ring around the correct answer to complete the sentence and the word equation.

4 (b) (i) Zinc carbonate decomposes in a similar way to calcium carbonate

when [water is added. / cooled. / heated.]

(1 mark)

4 (b) (ii) zinc carbonate ⟶ zinc oxide + [carbon dioxide / hydrogen / oxygen]

(1 mark)

Question 4 continues on the next page

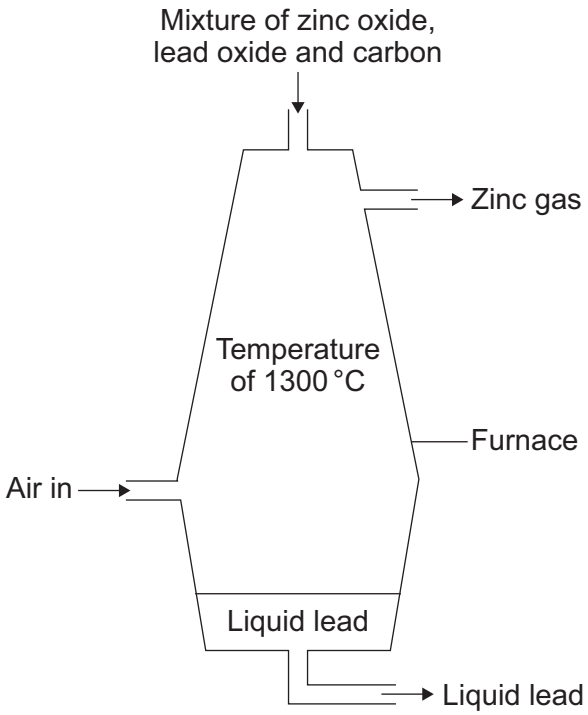
Do not write outside the box

4 (c) Another ore contains a mixture of zinc carbonate and lead carbonate.

The metals zinc and lead are produced from this ore in two stages:

Stage 1 decomposing the carbonates to produce a mixture of zinc oxide and lead oxide.

Stage 2 mixing the oxides with carbon and heating in a furnace.



Some of the reactions in the furnace are:

zinc oxide + carbon ⟶ zinc + carbon dioxide

lead oxide + carbon ⟶ lead + carbon dioxide

carbon + oxygen ⟶ carbon dioxide

Do not write outside the box

Use the information given to help you to answer these questions.

4 (c) (i) Draw a ring around the correct answer to complete the sentence.

The reaction between carbon and oxygen that heats the

furnace is called

- combustion.
- decomposition.
- evaporation.

(1 mark)

4 (c) (ii) Tick (✓) **one** reason why carbon reacts with zinc oxide to produce zinc.

Reason	Tick (✓)
carbon is less reactive than zinc	
carbon is more reactive than zinc	
carbon is similar in reactivity to zinc	

(1 mark)

4 (c) (iii) In the furnace zinc is a gas but lead is a liquid.

Suggest why.

.....

.....

.....

.....

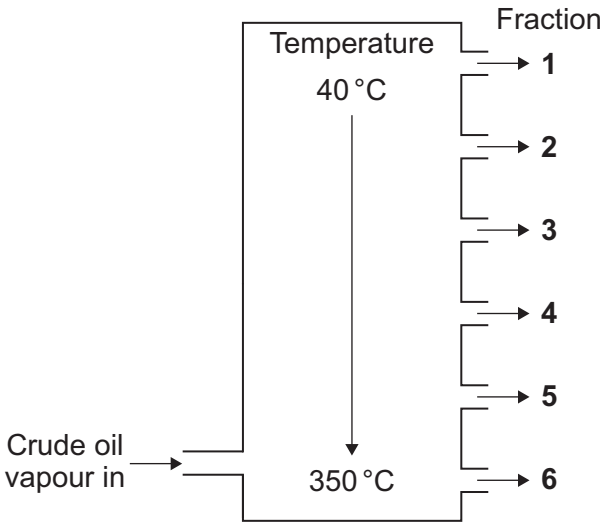
(2 marks)

8

Turn over for the next question

Do not write outside the box

5 Crude oil is a mixture of hydrocarbons.
Crude oil can be separated into fractions.



5 (a) (i) Complete the sentence.

The process used to separate the crude oil into fractions is called

fractional ..... .

(1 mark)

5 (a) (ii) Why do the fractions separate at different temperatures?

.....

.....

(1 mark)

Do not write outside the box

5 (b) Tick (✓) **two** properties of fraction **6**.

Property	Tick (✓)
contains hydrocarbons	
has a small number of carbon atoms in each molecule	
is easy to ignite	
has a high boiling point	

(2 marks)

5 (c) Fraction **1** contains hydrocarbons called alkanes.
The general formula of an alkane is: C_nH_{2n+2}

What is the formula of the alkane that has 5 carbon atoms in each molecule?

Draw a ring around the correct answer.

C_5H_9 **C_5H_{10}** **C_5H_{11}** **C_5H_{12}**

(1 mark)

5

Turn over for the next question

Do not write outside the box

6 Scientists state that unsaturated fats are healthier to eat than saturated fats.

The table shows some information about four fats.

	Fat content as a percentage (%)		
Fat	**Unsaturated**	**Saturated**	**Melting point in °C**
A	80	20	–11
B	60	40	–5
C	30	70	+4
D	10	90	+63

6 (a) (i) Which fat, **A**, **B**, **C** or **D**, has the lowest melting point? ☐

(1 mark)

6 (a) (ii) Use the information in the table to describe the pattern between the percentage of unsaturated fat and the melting point.

.....

.....

(1 mark)

6 (a) (iii) Which fat, **A**, **B**, **C** or **D**, contains the smallest number of carbon carbon double bonds per gram? ☐

(1 mark)

6 (b) Fat **A** is reacted with hydrogen (hydrogenated).

State **one** way in which the physical properties of Fat **A** are changed by this reaction.

.....

.....

(1 mark)

Do not write outside the box

6 (c) Tick (✓) **one** thing that scientists are **not** able to do.

One thing that scientists are not able to do	Tick (✓)
find out if a fat is unsaturated	
show that an unsaturated fat is healthier to eat than a saturated fat	
stop people eating unhealthy fat	
change unsaturated fat to saturated fat	

(1 mark)

5

Turn over for the next question

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

7 The raw materials used to make the polymer polyvinyl chloride (PVC) are crude oil and sea salt (sodium chloride).

7 (a) There are three main stages in the production of PVC.

7 (a) (i) **Stage 1** Cracking of hydrocarbons from crude oil produces ethene, C_2H_4

$$C_{10}H_{22} \longrightarrow C_8H_{18} + C_2H_4$$

How are hydrocarbons cracked?

.....

.....

.....

.....

(2 marks)

7 (a) (ii) **Stage 2** Electrolysis of sodium chloride solution produces chlorine.
Ethene from **Stage 1** is then reacted with this chlorine.
One of the hydrogen atoms in each ethene molecule is replaced by a chlorine atom to produce vinyl chloride.

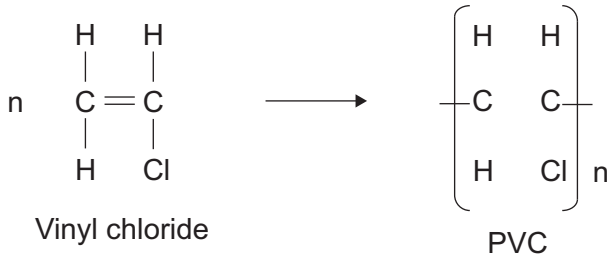
Complete the chemical equation by writing in the formula of the product vinyl chloride.

$$C_2H_4 + Cl_2 \longrightarrow \text{.....} + HCl$$

(1 mark)

7 (a) (iii) **Stage 3** Polymerisation of vinyl chloride produces polyvinyl chloride (PVC).

Complete the chemical equation by drawing in the missing bonds of the product, PVC.



(1 mark)

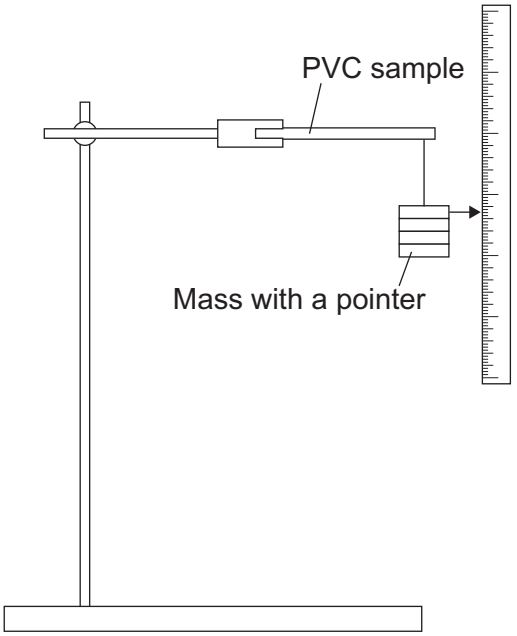
Question 7 continues on the next page

Turn over ▶

Do not write outside the box

7 (b) Unplasticised polyvinyl chloride (uPVC) is used to make door and window frames.
PVC with a plasticiser added is used to make cling film for wrapping food.
A plasticiser is a chemical compound.

A student investigated how the percentage of plasticiser added to PVC affected its flexibility.
The student measured the bending of PVC samples when a mass was added.



The student's results are shown in the table.

Sample of PVC	Percentage (%) of plasticiser added	Bending of PVC sample in mm				
		Test 1	Test 2	Test 3	Test 4	Mean
A	**0**	2	3	3	4	3
B	**5**	22	15	23	24	
C	**10**	27	27	29	29	28
D	**15**	34	35	35	36	35

7 (b) (i) Each PVC sample should be the same size to make it a fair test.
Explain why.

.....

.....

(1 mark)

Do not write outside the box

7 (b) (ii) The student repeated the test four times for each sample.
Explain why.

.....

.....

(1 mark)

7 (b) (iii) Calculate the mean value for sample **B**.

.....

.....

.....

.....

(2 marks)

7 (b) (iv) Each of the samples bent the most in test **4**.
Suggest a possible reason for this.

.....

.....

(1 mark)

7 (c) Suggest why unplasticised polyvinyl chloride (uPVC) is used to make door and window frames.

.....

.....

(1 mark)

10

END OF QUESTIONS

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright © 2011 AQA and its licensors. All rights reserved.

Version: 04/08/2011



General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Mark Scheme

2011 examination – June series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2011 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

CHY1F

Question 1

question	answers	extra information	mark
1(a)	layer 1 – crust layer 2 – mantle layer 3 – core	extra line from a layer cancels the mark	1 1 1
1(b)(i)	0.97	extra ring drawn cancels the mark	1
1(b)(ii)	carbon dioxide / CO_2		1
Total			**5**

STEMUP.CO.UK

CHY1F

Question 2

question	answers	extra information	mark
2(a)	sulfur dioxide / SO_2	allow sulfur oxide	1
2(b)	global dimming		1
2(c)	oxygen / O_2		1
2(d)	(oil is a) limited resource / finite / non-renewable	accept running out of oil **or** wood is sustainable accept (burning oil) increases amount of carbon dioxide in the atmosphere / global warming **or** releases locked up carbon / global dimming / acid rain accept the oil (may become) too expensive	1
2(e)	carbon dioxide produced (from burning wood) carbon dioxide used by plants / trees **or** for photosynthesis	ignore global warming if no other mark awarded allow carbon emissions used by plants / trees **or** for photosynthesis for **1** mark	1 1
Total			**6**

STEMUP.CO.UK

CHY1F

Question 3

question	answers	extra information	mark
3(a)	to improve the appearance of the drink because they are permitted colours		1 1
3(b)(i)	chromatography		1
3(b)(ii)	three / 3		1
3(b)(iii)	because one colour / spot / E102 matched because the other / two colours / spots / E104 and E110 did not match	if no other mark awarded allow because the drink did not contain E104 and E110 **or** because the drink contained E102 for **1** mark accept only E102 matched for **2** marks	1 1
Total			**6**

STEMUP.CO.UK

CHY1F

Question 4

question	answers	extra information	mark
4(a)	(carbon =) 1 (oxygen =) 3		1 1
4(b)(i)	heated		1
4(b)(ii)	carbon dioxide		1
4(c)(i)	combustion		1
4(c)(ii)	carbon is more reactive than zinc		1
4(c)(iii)	zinc boils (in the furnace / below 1300°C) lead does not boil / (only) melts in the furnace / boils above 1300°C	ignore melting point / changes of state if no other mark awarded allow zinc has a lower boiling point **or** lead has a higher boiling point **or** they / zinc **and** lead have different boiling points for **1** mark	1 1
Total			**8**

STEMUP.CO.UK

CHY1F

Question 5

question	answers	extra information	mark
5(a)(i)	distillation		1
5(a)(ii)	condense (at different temperatures)	accept they / fractions / hydrocarbons have different boiling points ignore melting point / size of molecule	1
5(b)	contains hydrocarbons has a high boiling point		1 1
5(c)	C_5H_{12}		1
Total			**5**

STEMUP.CO.UK

CHY1F

Question 6

question	answers	extra information	mark
6(a)(i)	A	allow –11	1
6(a)(ii)	as the percentage of unsaturated fat decreases the melting point increases **or** vice versa	ignore boiling point / temperature ignore pattern linked to the percentage of saturated fat ignore numerical values	1
6(a)(iii)	D	allow 10	1
6(b)	any **one** from: • increase the melting point • make it 'spreadable' • make it solid (at room temperature) • increase the % of saturated fat **or** decrease the % of unsaturated fat	do **not** accept to make it less healthy **or** more healthy ignore boiling point allow make it hard(er) ignore density / mass / viscous / thicker allow make it saturated ignore references to double / single bonds	1
6(c)	stop people eating unhealthy fat		1
Total			**5**

STEMUP.CO.UK

CHY1F

Question 7

question	answers	extra information	mark
7(a)(i)		if (fractional) distillation / hydrogenation mentioned as the method = max 1	
	heat / high temperature / hot / vaporise	allow thermal decomposition ignore evaporation do **not** accept 'burns' do **not** accept temperature < 100	1
	catalyst **or** silica / alumina / porous pot **or** steam	ignore other named catalyst allow heat (the vapour) to a very high temperature / >800°C for **2** marks	1
7(a)(ii)	C_2H_3Cl	ignore attempts to balance equation	1
7(a)(iii)	single bonds between C – H, C – Cl **and** C – C	do **not** accept symbols outside the bracket	1
7(b)(i)	so that the amount of plasticiser / (sample of) PVC is the independent / only variable that affects the bending / flexibility of the samples	allow because different sizes would give different results accept because size is a control variable ignore references to reliability / precision etc	1
7(b)(ii)	to improve the reliability (of the investigation)	accept to calculate a mean accept to check for anomalous results **or** to check the range of results ignore accuracy / precision etc	1

Question 7 continues on the next page

STEMUP.CO.UK

Question 7 continued

question	answers	extra information	mark
7(b)(iii)	23	correct answer with or without working = **2** marks if answer is incorrect allow $\frac{22+23+24}{3}$ **or** 21 for **1** mark	2
7(b)(iv)	(PVC) sample had been stretched / used / tested in first three tests	accept higher temperature allow worn **or** become weaker ignore (human) error ignore more flexible / softer ignore intermolecular forces	1
7(c)	does not bend (easily / much) **or** it is not flexible **or** it is rigid	ignore non-biodegradable / low maintenance ignore sturdy / stronger / harder	1
Total			**10**

The AQA UMS Conversion Calculator is available on the Results statistics page of the AQA Website

STEMUP.CO.UK

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

General Certificate of Secondary Education
Foundation Tier
January 2011

Science B
Unit Chemistry C1

CHY1F

F

Chemistry
Unit Chemistry C1

Written Paper

Monday 17 January 2011 9.00 am to 9.45 am

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.

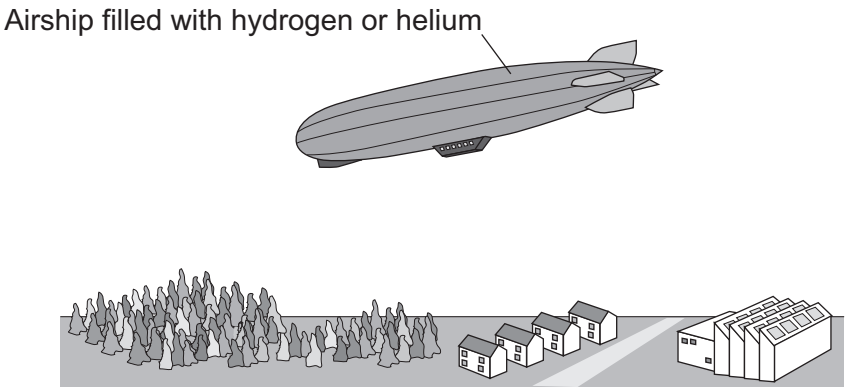
Advice
- In all calculations, show clearly how you work out your answer.

STEMUP.CO.UK

Do not write outside the box

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

1 Hydrogen and helium have both been used in airships.



1 (a) Tick (✓) the property which both hydrogen and helium have that makes an airship float in air.

Property	Tick (✓)
Colourless	
Less dense than air	
More dense than air	

(1 mark)

1 (b) (i) Hydrogen is no longer used in airships because it burns in oxygen.

The chemical equation for this reaction is shown.

$$2H_2 \quad + \quad O_2 \quad \rightarrow \quad 2H_2O$$

Complete the word equation for this reaction.

hydrogen + oxygen → .....

(1 mark)

Do not write outside the box

1 (b) (ii) Helium is safer than hydrogen because it does **not** burn in oxygen.

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

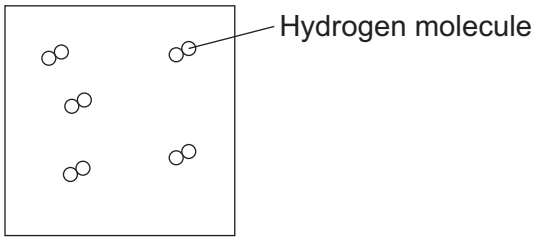
Helium is now used in airships because it is

- a fuel.
- already in the air.
- unreactive.

(1 mark)

1 (c) **Diagram 1** represents hydrogen molecules.

Diagram 1



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

Each hydrogen molecule is made up of two hydrogen

- atoms.
- compounds.
- elements.

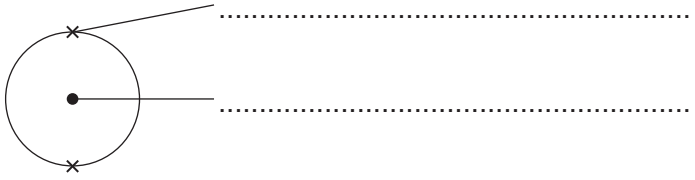
(1 mark)

1 (d) **Diagram 2** shows the parts of a helium atom.

Use words from the box to label **diagram 2**.

bond	**electron**	**nucleus**

Diagram 2



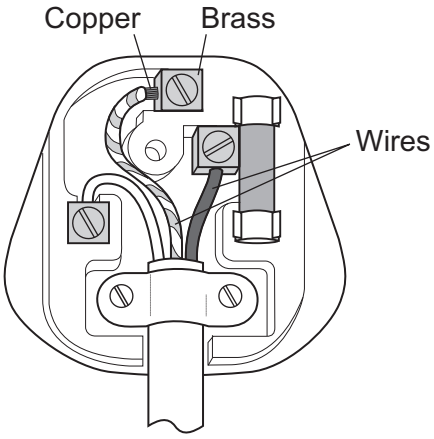
(2 marks)

6

Turn over ▶

Do not write outside the box

2 The diagram shows an electric plug.



2 (a) (i) Draw a ring around the correct answer to complete the sentence.

Copper is used for the wires because it

- conducts electricity.
- conducts heat.
- is shiny.

(1 mark)

2 (a) (ii) Brass is an *alloy* of copper and zinc.

What is an *alloy*?

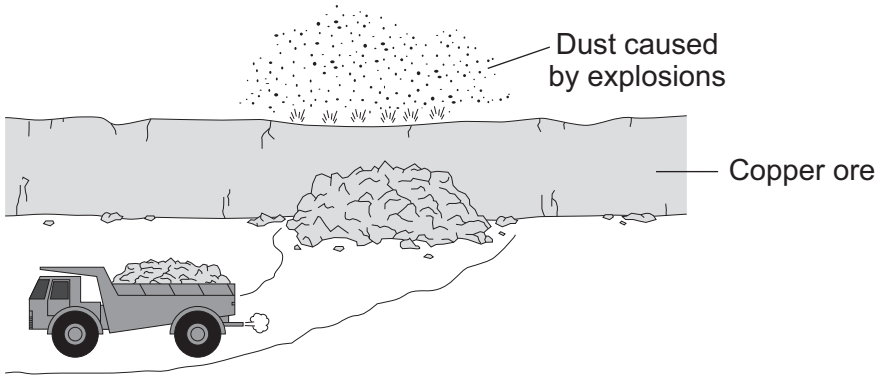
.....

.....

(1 mark)

Do not write outside the box

2 (b) Open-cast mines are used to obtain copper ore.



Suggest **two** reasons why people would **not** like to live near an open-cast mine.

1 .....

.....

2 .....

.....

(2 marks)

4

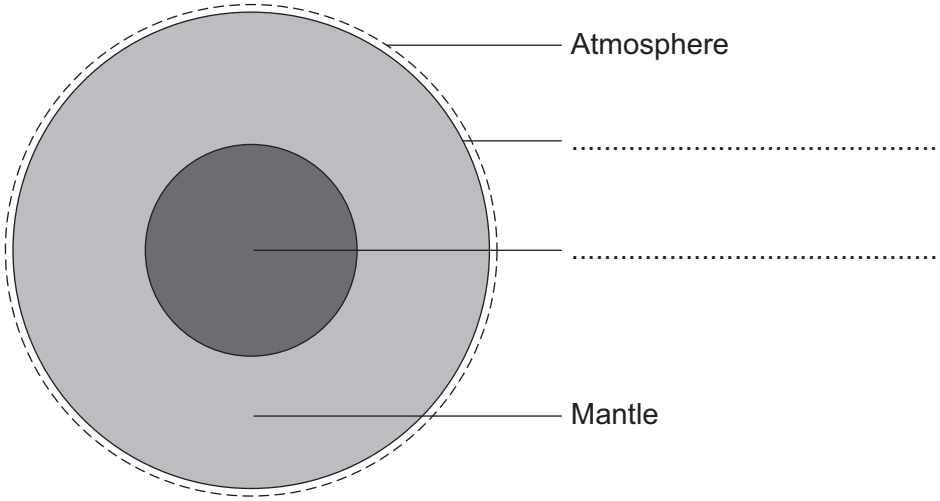
Turn over for the next question

Do not write outside the box

3 The Earth has a layered structure and is surrounded by an atmosphere.

3 (a) The diagram shows the layers of the Earth.

Complete the labels on the diagram.



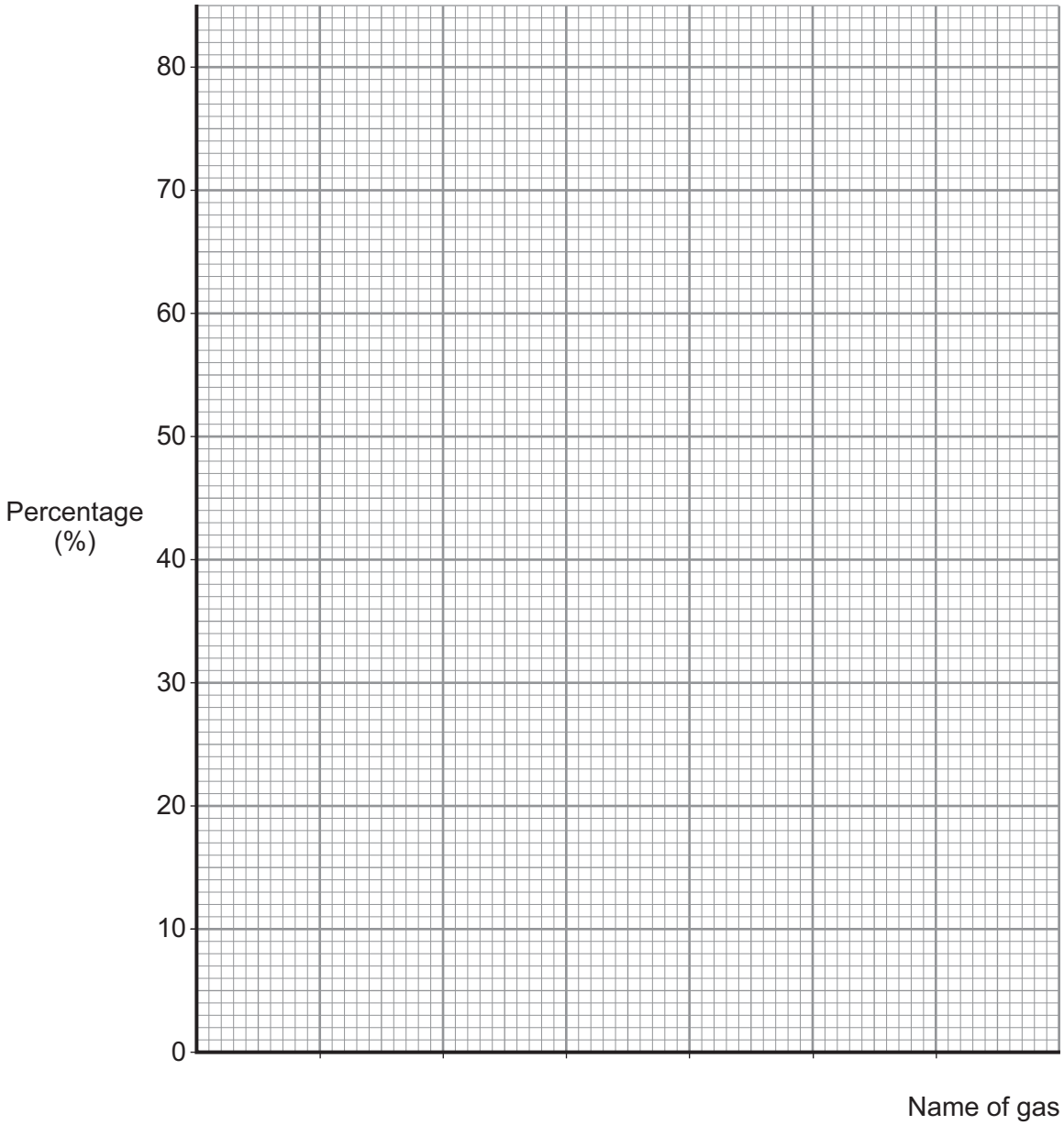
(2 marks)

3 (b) The data in the table shows the percentages of the gases in the Earth's atmosphere.

Name of gas	Percentage (%) of gas
Nitrogen	78
Oxygen	21
Other gases	1

Do not write outside the box

Present the data in the table on the grid below.



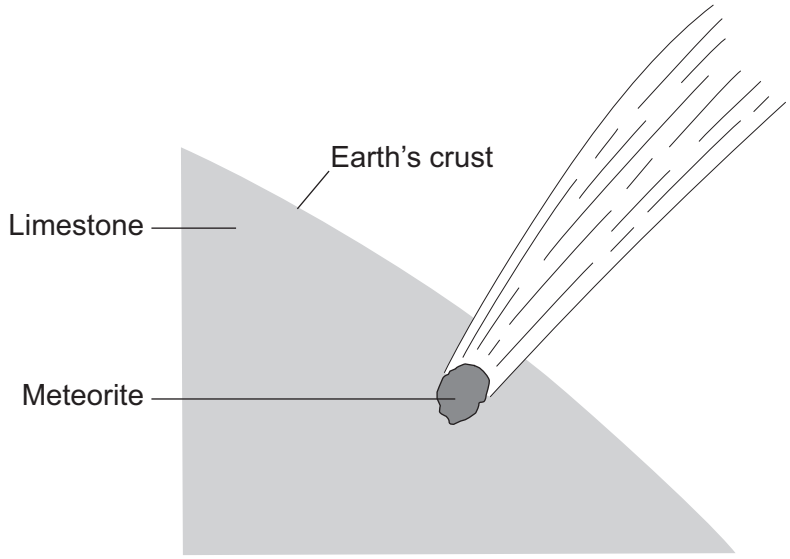
(3 marks)

Question 3 continues on the next page

Turn over ▶

Do not write outside the box

3 (c) Millions of years ago a large meteorite hit the Earth.
The meteorite heated limestone in the Earth's crust to a very high temperature.
The heat caused calcium carbonate in the limestone to release large amounts of carbon dioxide.



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

3 (c) (i) Carbon dioxide was released because the calcium carbonate was

decomposed.

evaporated.

reduced.

(1 mark)

3 (c) (ii) More carbon dioxide in the Earth's atmosphere causes

acid rain.

global dimming.

global warming.

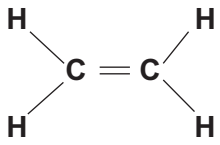
(1 mark)

7

Do not write outside the box

4 Supermarkets in the UK have been advised by the Government to stop giving plastic bags to customers.
Plastic bags are made from a polymer.
The polymer is made from ethene.

The structural formula of ethene is shown.



Ethene is made by cracking hydrocarbons.
These hydrocarbons come from crude oil.

4 (a) Complete these sentences about ethene.

4 (a) (i) Ethene is a hydrocarbon because it contains only ..... and

..... .

(2 marks)

4 (a) (ii) Ethene is unsaturated because it has a ..... bond.

(1 mark)

4 (b) Tick (✓) the name of the polymer formed when many ethene molecules join together.

Name of polymer	Tick (✓)
poly(chloroprene)	
poly(ethene)	
poly(propene)	

(1 mark)

4 (c) Suggest **two** reasons why supermarkets should stop giving plastic bags to customers.

1 .....

.....

2 .....

.....

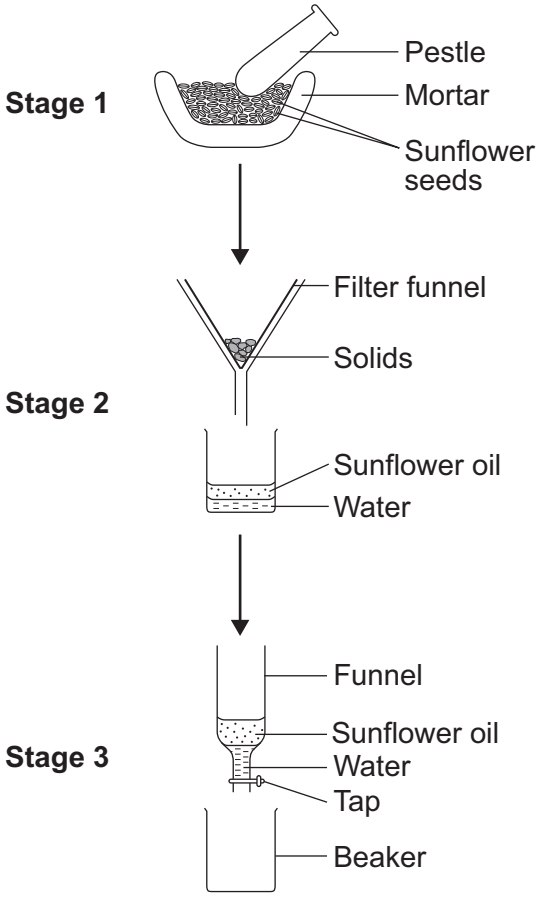
(2 marks)

6

Turn over ▶

Do not write outside the box

5 (a) The diagram shows how sunflower oil can be extracted from sunflower seeds in three stages.



5 (a) (i) Complete the sentences.

To release the oil and water in **stage 1** the sunflower seeds

are ..... .

To remove any solids in **stage 2** the mixture is ..... .

(2 marks)

Do not write outside the box

5 (a) (ii) Describe how the funnel with a tap in **stage 3** is used to separate the oil from the water.

.....

.....

.....

.....

(2 marks)

5 (b) Some crisps are made by frying thin slices of potato in sunflower oil.
Colours can be added to improve the appearance of the crisps.
Chromatography is used to check if these colours are safe to eat.
One result is shown below.



Use the results to help you to answer these questions.

5 (b) (i) How many colours were added to the crisps? .....

(1 mark)

5 (b) (ii) Are the crisps safe to eat? Explain your answer.

.....

.....

.....

(1 mark)

5 (b) (iii) Why would a manufacturer want to improve the appearance of their crisps?

.....

.....

(1 mark)

7

Turn over ▶

Do not write outside the box

6 The flow diagram shows the main stages used to extract a metal from its ore.

mining the ore → purifying the ore → extracting the metal

The table shows some information about three metals.

Metal	Metal ore	Purified ore	% of metal in the ore	% of metal in the Earth's crust
aluminium	bauxite	aluminium oxide, Al_2O_3	28.0	8.0
copper	chalcocite	copper sulfide, Cu_2S	0.5	0.001
iron	haematite	iron oxide, Fe_2O_3	29.0	5.0

6 (a) Use the information in the table and your knowledge and understanding to help you to answer the questions.

6 (a) (i) Suggest why purifying the copper ore produces large quantities of waste.

.....

.....

.....

(1 mark)

6 (a) (ii) Suggest why the annual world production of iron is forty times greater than that of aluminium.

.....

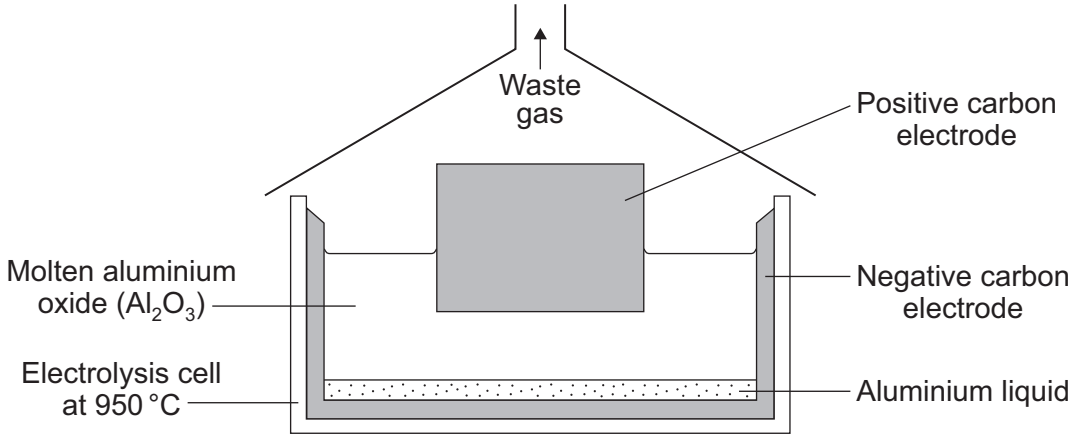
.....

.....

(1 mark)

Do not write outside the box

6 (b) Aluminium is used for drinks cans.
Aluminium is extracted from its purified ore by electrolysis.



6 (b) (i) Suggest why the aluminium produced in the electrolysis cell is a liquid.

.....

.....

(1 mark)

6 (b) (ii) In this electrolysis, aluminium and oxygen gas are produced from the aluminium oxide.

Use the information in the diagram to suggest why most of the waste gas is carbon dioxide and not oxygen.

.....

.....

.....

.....

(2 marks)

6 (b) (iii) Aluminium is the most abundant metal in the Earth's crust.

Suggest **two** reasons why we should recycle aluminium drinks cans.

1 .....

.....

2 .....

.....

(2 marks)

7

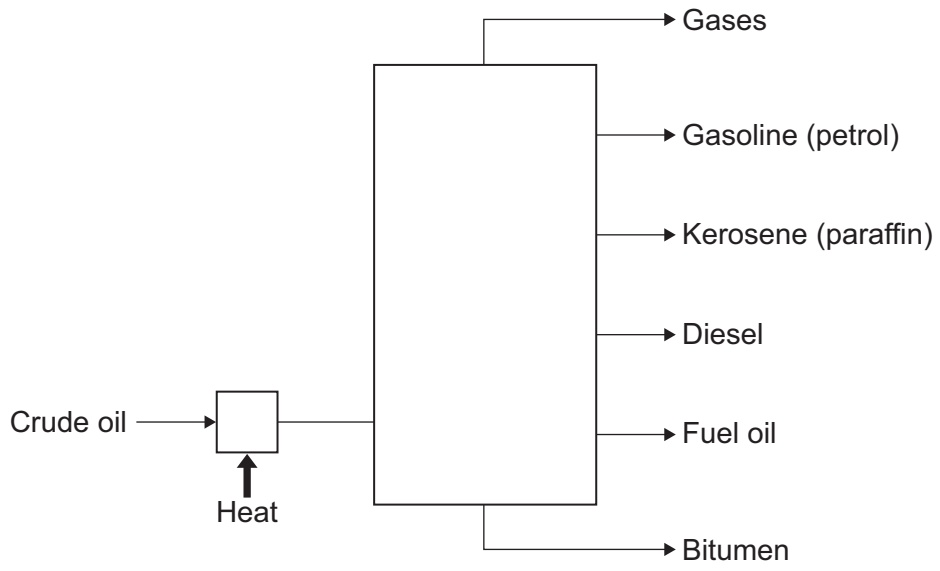
Turn over ▶

STEMUP.CO.UK

Do not write outside the box

7 Crude oil is used to produce many useful materials.

7 (a) The diagram shows some of the fractions produced from crude oil by fractional distillation.



Use the diagram to help you to explain how crude oil is separated into fractions.

You should use the words evaporated and condensed in your answer.

.....

.....

.....

.....

.....

.....

.....

.....

(3 marks)

Do not write outside the box

7 (b) The table shows some information about four of the fractions from crude oil that are used as fuels.

Fraction	Boiling point in °C	Number of carbon atoms found in the molecules
Gasoline (petrol)	20 – 200	5 – 10
Kerosene (paraffin)	180 – 260	10 – 16
Diesel	260 – 340	14 – 20
Fuel oil	370 – 600	20 – 70

Use the information in the table to help you to answer these questions.

7 (b) (i) How can you tell that each of the fractions is a mixture?

.....

.....

(1 mark)

7 (b) (ii) How does the number of carbon atoms in a molecule affect its boiling point?

.....

.....

(1 mark)

7 (c) Fuels are substances that release energy.

7 (c) (i) Name the reaction that releases energy from a fuel such as gasoline (petrol).

.....

(1 mark)

7 (c) (ii) Describe how fuel oil is broken down into smaller, more useful molecules such as gasoline (petrol).

.....

.....

.....

.....

(2 marks)

8

END OF QUESTIONS

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright © 2011 AQA and its licensors. All rights reserved.

Version : 08/03/2011



General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Mark Scheme

2011 examination – January series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2011 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

CHY1F

Question 1

question	answers	extra information	mark
1(a)	less dense than air		1
1(b)(i)	water	accept hydrogen oxide do **not** accept hydrogen dioxide / hydro oxide	1
1(b)(ii)	unreactive		1
1(c)	atoms		1
1(d)	electron(s) nucleus		1 1
Total			**6**

STEMUP.CO.UK

CHY1F

Question 2

question	answers	extra information	mark
2(a)(i)	conducts electricity		1
2(a)(ii)	mixture (of metals)	(it = alloy)	1
2(b)	any **two** from: • noise • dust • traffic • eyesore	ignore pollution without qualification allow dirt	2
Total			**4**

STEMUP.CO.UK

CHY1F

Question 3

question	answers	extra information	mark
3(a)	crust	ignore Earth's	1
	core	ignore inner and/or outer	1
3(b)	bar chart		1
	all heights are correct	accept correctly plotted points	1
	all labels are correct for nitrogen, oxygen and other / argon		1
3(c)(i)	decomposed		1
3(c)(ii)	global warming		1
Total			**7**

STEMUP.CO.UK

CHY1F

Question 4

question	answers	extra information	mark
4(a)(i)	carbon hydrogen	accept in either order ignore number eg 2 carbons 4 hydrogens	1 1
4(a)(ii)	(a carbon carbon) double (bond)		1
4(b)	poly(ethene)		1
4(c)	any **two** from: • made from crude oil • non–renewable resources • litter • not biodegradable • use energy to make • when burned or biodegraded carbon dioxide is released • encourage customers to reuse bags / use their own bags	ignore pollution / cost / global warming / harms environment / recycling accept resources are running out accept go to landfill accept reduces carbon emissions / footprint	2
Total			**6**

STEMUP.CO.UK

CHY1F

Question 5

question	answers	extra information	mark
5(a)(i)	crushed / pressed filtered	 allow sieve	1 1
5(a)(ii)	tap opened **or** allow water through tap closed before oil runs through	 accept to leave oil (in the funnel) accept collect oil in a different beaker	1 1
5(b)(i)	3 / three		1
5(b)(ii)	one colour is unsafe / two colours are safe	ignore no or do not know or yes need to check the one colour that is different	1
5(b)(iii)	make (more) profit / money	accept sell (more) crisps **or** (more) people will want to buy their crisps	1
Total			**7**

STEMUP.CO.UK

CHY1F

Question 6

question	answers	extra information	mark
6(a)(i)	low percentage / very little of metal (in the ore)	accept only 0.5% metal in the ore **or** over 99% waste in the ore **or** nearly 100% waste in the ore ignore reference to percentage of metal in the Earth's crust **or** energy used or pollution	1
6(a)(ii)	any **one** from • iron uses less energy / fuel for extraction • iron has more uses • more demand for iron • iron is stronger • cheaper / costs less • easier to extract	(it = iron) ignore electrolysis / uses electricity / reactivity ignore high abundance in the Earth's crust / high percentage of metal in ore ignore harder	1
6(b)(i)	has melting point lower than 950°C	(it = aluminium) allow has a low melting point ignore boiling point	1
6(b)(ii)	electrode(s) made of carbon oxygen reacts with electrode(s) / carbon	 accept $C + O_2 (\rightarrow CO_2)$ NB oxygen reacts with the carbon electrode(s) = **2** marks	1 1

Question 6 continues on the next page

STEMUP.CO.UK

CHY1F

Question 6 contd

question	answers	extra information	mark
6(b)(iii)	any **two** from: • saves resources / non renewable • landfill problem • saves energy / fuel / electricity • less carbon dioxide / carbon emissions or reduces carbon footprint • less quarrying / mining	 accept aluminium / ore will run out or conserves aluminium accept aluminium does not corrode ignore global warming ignore consequences of quarrying / mining ignore pollution / harms environment / costs / easy to recycle	2
Total			**7**

STEMUP.CO.UK

CHY1F

Question 7

question	answers	extra information	mark
7(a)	crude oil / it is evaporated / vaporised	ignore heated	1
	vapours / gases / fractions cool and condense	accept named fraction(s)	1
	(different) vapours / gases / fractions (condense) at different temperatures	accept (different) vapours / gases / fractions have different boiling points max **2** marks for description of laboratory method **or** mention of cracking	1
7(b)(i)	any **one** from: • range of boiling points • range of carbon atoms		1
7(b)(ii)	greater the number (of carbon atoms) the higher the boiling point	do **not** accept molecules / particles	1
7(c)(i)	burning / combustion	allow oxidation / redox	1
7(c)(ii)	any **two** from: • cracking / (thermal) decomposition • heat / vaporise • catalyst / aluminium oxide	reaction with hydrogen gains max of **1** mark only allow porous pot ignore names of other catalysts	2
Total			**8**

STEMUP.CO.UK

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

AQA

General Certificate of Secondary Education
Foundation Tier
June 2010

Science B
Unit Chemistry C1

CHY1F

F

Chemistry
Unit Chemistry C1

Written Paper

Wednesday 16 June 2010 9.00 am to 9.45 am

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.

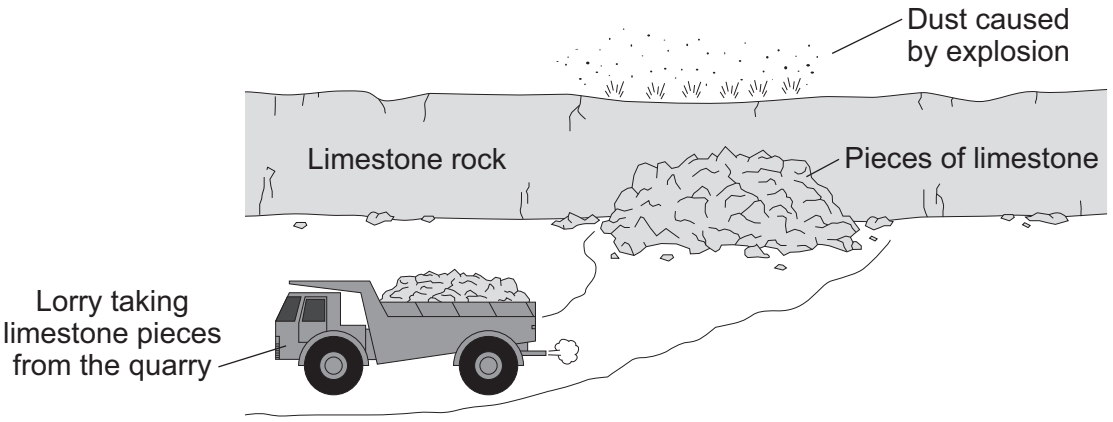
Advice
- In all calculations, show clearly how you work out your answer.

STEMUP.CO.UK

Do not write outside the box

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

1 In a quarry, limestone is blasted into pieces by explosives.
The pieces of limestone are taken from the quarry by lorries.



1 (a) Draw a ring around the correct word in the box to complete the sentence.

Limestone can be used as a | building / plastic / smart | material.

(1 mark)

1 (b) Tick (✓) **one** possible advantage for people who live near to the limestone quarry.

Advantage	Tick (✓)
causes more traffic	
provides jobs	
attracts tourists to the area	

(1 mark)

Do not write outside the box

1 (c) Give **two** types of pollution that would be caused by the limestone quarry.

1 .....

2 .....

(2 marks)

1 (d) Limestone contains calcium carbonate ($CaCO_3$).

Complete the **two** empty boxes in the table about the formula of calcium carbonate.

Name of element	Symbol for the element	Number of atoms in the formula
calcium	Ca	1
carbon	C	1
oxygen	.....	.....

(2 marks)

1 (e) Lorries take some of the limestone to be heated in a lime-kiln.
Calcium carbonate, in the limestone, decomposes when heated.

Use the balanced chemical equation to help you complete the word equation for the decomposition of calcium carbonate.

$CaCO_3$ → CaO + CO_2

calcium carbonate → ..... + carbon dioxide

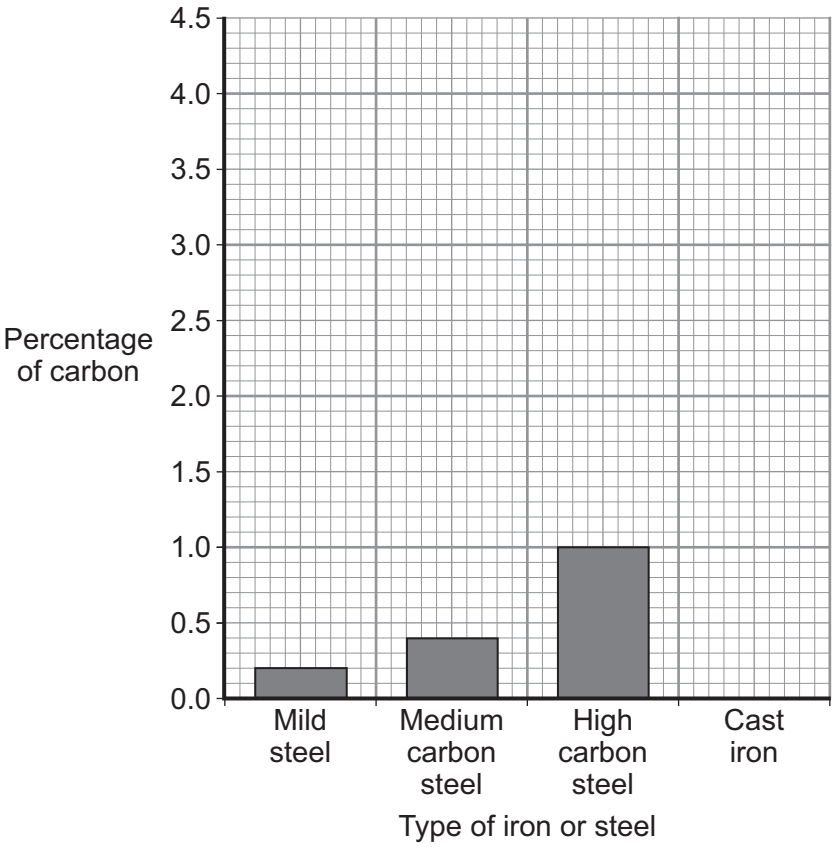
(1 mark)

7

Turn over for the next question

Do not write outside the box

2 The bar chart shows the percentage of carbon in three types of steel.



2 (a) Draw a ring around the correct word in the box to complete the sentence.

Steel is the name used for | alloys / atoms / ores | of iron.

(1 mark)

2 (b) Cast iron contains 4% carbon.

Draw the bar for cast iron on the chart.

(1 mark)

2 (c) Cast iron is more brittle than these three types of steel.

Use the bar chart to suggest why.

.....

.....

(1 mark)

Do not write outside the box

2 (d) One type of stainless steel contains iron with 0.2% carbon to which 8% nickel and 18% chromium were added.

2 (d) (i) Tick (✓) the percentage of iron in this type of stainless steel.

Percentage (%) of iron	Tick (✓)
92.4	
88.6	
73.8	

(1 mark)

2 (d) (ii) Use the bar chart to name the type of steel that contains only 0.2% carbon.

.....

(1 mark)

2 (d) (iii) Draw a ring around the correct word in the box to complete the sentence.

Stainless steel is used for knives and forks because it is resistant to

corrosion.

decomposition.

distillation.

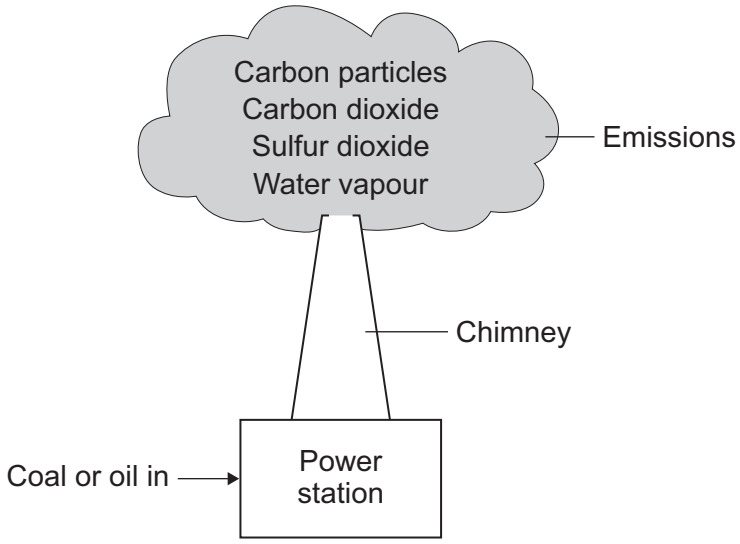
(1 mark)

6

Turn over for the next question

Do not write outside the box

3 In the future more coal-fired and fewer oil-fired power stations will be used to generate electricity.
When coal and oil are burned they produce the same types of emissions which can cause environmental problems.



3 (a) Emissions from the chimney can cause acid rain, global dimming and global warming.
Draw **one** straight line from each possible environmental problem to the emission that causes it.

Possible environmental problem	**Emission that causes it**
acid rain	carbon particles
global warming	carbon dioxide
global dimming	sulfur dioxide
	water vapour

(3 marks)

3 (b) Draw a ring around the correct word in the box to complete each sentence.

3 (b) (i) Incomplete combustion of coal or oil is caused by too little

carbon dioxide.
nitrogen.
oxygen.

(1 mark)

Do not write outside the box

3 (b) (ii) A gas formed by the incomplete combustion of coal or oil is

carbon monoxide.
hydrogen.
oxygen.

(1 mark)

3 (c) The table shows the world production for both coal and oil in 2000.
The world production figures after 2000 are predicted.

Year	World production of coal (billions of tonnes per year)	World production of oil (billions of barrels per year)
2000	3.5	12.5
2050	4.5	5.6
2100	5.0	1.7
2150	5.5	0.5
2200	6.0	0.0

3 (c) (i) How is the world production of oil predicted to change from 2000 to 2200?

.....

.....

(1 mark)

3 (c) (ii) Suggest **two** reasons why the world production of coal is predicted to increase.

1 .....

.....

2 .....

.....

(2 marks)

8

Turn over ▶

Do not write outside the box

4 An article had the following headline.

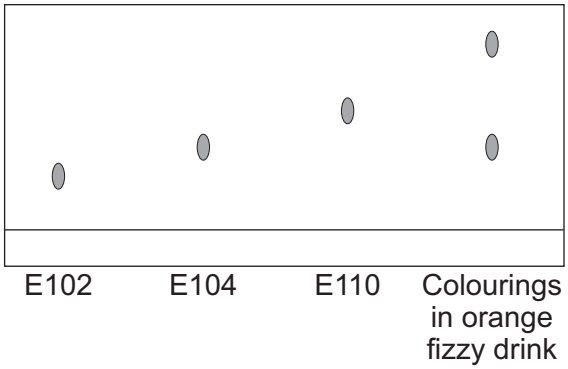
NEW FEAR OVER DRINK ADDITIVES

Some children get headaches and skin problems that are possibly caused by some types of fizzy orange drinks.

These fizzy drinks all contain water, carbon dioxide, artificial flavourings and colourings.

Three artificial colourings that have been used in fizzy orange drinks are tartrazine (E102), quinoline yellow (E104) and sunset yellow (E110).

4 (a) Colourings can be detected by chromatography.
The results of chromatography for the colourings in one fizzy orange drink are shown.



4(a) (i) How many colourings are there in the fizzy orange drink? .....

(1 mark)

4 (a) (ii) Which one of the colourings, E102, E104 or E110, does the fizzy orange drink contain?

Explain your answer.

E..... because .....

.....

.....

(2 marks)

4 (b) (i) Why are artificial colourings added to some fizzy orange drinks?

.....

.....

(1 mark)

Do not write outside the box

4 (b) (ii) Some people believe that artificial colourings cause headaches and skin problems.

Suggest **one** other substance in the fizzy orange drink that may cause these problems.

.....

(1 mark)

4 (c) Plastic bottles are often used as drink containers.

4 (c) (i) Draw a ring around the correct word in each box to complete the sentence.

The plastic is made by joining together many small molecules called

fractions
metals
monomers

to form very large molecules called

alloys.
polymers.
gases.

(2 marks)

4 (c) (ii) Used plastic bottles should **not** be dumped in landfill sites.

Give **two** reasons for this.

1 .....

.....

2 .....

.....

(2 marks)

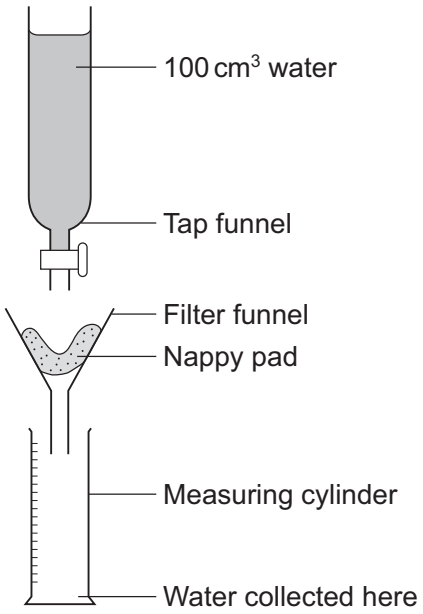
9

Turn over for the next question

Do not write outside the box

5 Disposable nappies for babies need to absorb as much water as possible. Disposable nappies have a pad containing a special polymer called a hydrogel. Hydrogels absorb water.

A company called Aqanaps compared the water absorption of its nappy pads with nappy pads made by other companies.



- A scientist from Aqanaps poured 100 cm^3 of water onto the pad of one of its nappies.
- He measured the volume of water that passed through.
- He did the test three times using a new nappy pad for each test.
- The scientist then repeated the procedure using the nappy pads from three other companies, **A**, **B** and **C**.

The results are shown in the table.

Company	**Volume of water collected in cm^3**		
	Pad 1	**Pad 2**	**Pad 3**
Aqanaps	55	57	55
A	47	46	39
B	65	63	64
C	38	39	38

Do not write outside the box

5 (a) (i) Choose **one** result in the table that should be tested again.

Result: Company ..... Pad .....

Explain why you chose this result.

.....

.....

.....

(2 marks)

5 (a) (ii) Suggest **one** variable that should be controlled in this investigation.

.....

.....

(1 mark)

5 (a) (iii) Suggest **one** possible cause of error in this investigation.

.....

.....

(1 mark)

5 (b) (i) The Aqanaps company studied the results. The company concluded that it should increase the amount of hydrogel used in its nappy pads.

Give **two** reasons why the company decided to increase the amount of hydrogel used in its nappy pads.

1 .....

.....

2 .....

.....

(2 marks)

5 (b) (ii) Suggest **one** disadvantage for the company if it increases the amount of hydrogel used in its nappy pads.

.....

.....

(1 mark)

7

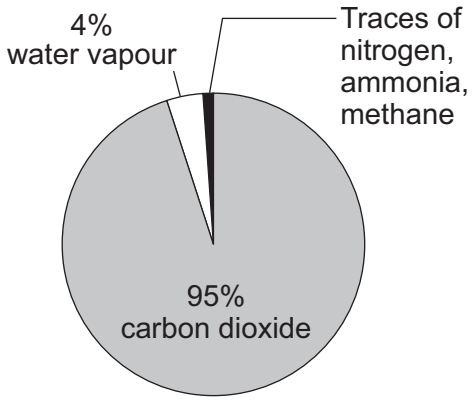
Do not write outside the box

6 (a) Scientists have suggested that:

- the Earth formed as a molten ball of rock and minerals
- the rock and minerals cooled slowly
- the surface of the Earth was covered by volcanoes
- the volcanoes released gases that formed the Earth's early atmosphere.

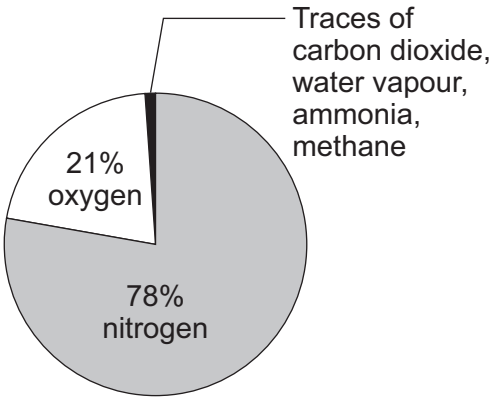
The pie charts show the approximate percentages of gases in the Earth's early atmosphere and in the Earth's atmosphere today.

Earth's early atmosphere



Average surface temperature above 400 °C

Earth's atmosphere today



Average surface temperature 20 °C

6 (a) (i) Explain what has happened to most of the water vapour in the Earth's early atmosphere.

.....

.....

.....

.....

(2 marks)

6 (a) (ii) Give **two** reasons why the percentage of carbon dioxide in the Earth's early atmosphere decreased.

1 .....

.....

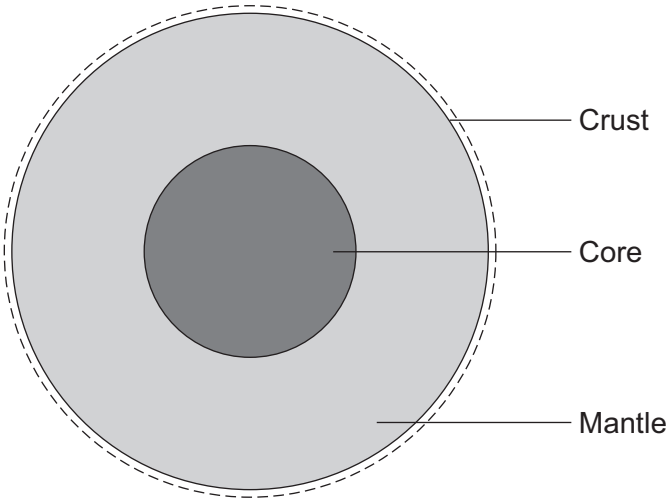
2 .....

.....

(2 marks)

Do not write outside the box

6 (b) Scientists have suggested that the Earth consists of a core, mantle and crust.



A 'traditional' theory is that the core is made of iron and nickel.

A 'controversial' theory is that the core is like a nuclear reactor made of the radioactive elements uranium and plutonium.

6 (b) (i) Why can scientists **not** prove which theory about the core is correct?

.....

.....

(1 mark)

6 (b) (ii) How can the 'controversial' theory be used to explain why the Earth's tectonic plates move?

.....

.....

.....

.....

.....

.....

(3 marks)

8

END OF QUESTIONS

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright © 2010 AQA and its licensors. All rights reserved.

STEMUP.CO.UK

Version: 17/08/2010

General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Mark Scheme

2010 Examination – June Series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2010 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX

Marking Guidance for Examiners

GCSE Science Papers

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example:

where consequential marking needs to be considered in a calculation;

or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct

substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

CHY1F

Question 1

question	answers	extra information	mark
1(a)	building		1
1(b)	provides jobs		1
1(c)	any **two** from: • noise • dust / visual pollution • air / atmospheric • exhaust gases • (more) traffic	ignore references to water allow sound pollution accept global dimming ignore smoke accept acid rain / global warming / named gaseous pollutants accept more lorries	2
1(d)	O 3 / three	ignore any numbers	1 1
1(e)	calcium oxide	accept quicklime do **not** accept calcium dioxide	1
Total			**7**

STEMUP.CO.UK

CHY1F

Question 2

question	answers	extra information	mark
2(a)	alloys		1
2(b)	bar drawn correctly up to 4%	ignore width of bar	1
2(c)	(contains) more carbon	ignore contains 4% carbon accept higher level responses related to structure / arrangement of atoms	1
2(d)(i)	73.8		1
2(d)(ii)	mild (steel)		1
2(d)(iii)	corrosion		1
Total			**6**

STEMUP.CO.UK

CHY1F

Question 3

question	answers	extra information	mark
3(a)	acid rain → sulfur dioxide global warming → carbon dioxide global dimming → carbon particles		1 1 1
3(b)(i)	oxygen		1
3(b)(ii)	carbon monoxide		1
3(c)(i)	decreasing	accept running out / none left	1
3(c)(ii)	any **two** from: • world needs (more) energy • plentiful supply • (many) countries have coal • easy to find / extract • oil / gas is running out • cheap **or** cheaper than oil	it = coal accept population is increasing allow (greater) demand for coal / fuels / energy accept readily available allow coal will 'last longer' accept need to use less oil / gas accept need to use it to replace oil / gas	2
Total			**8**

STEMUP.CO.UK

CHY1F

Question 4

question	answers	extra information	mark
4(a)(i)	2 / two		1
4(a)(ii)	E104 spots are at the same level / match	 independent mark	1 1
4(b)(i)	to improve / enhance the colour / change the colour	ignore sell more drinks allow to improve appearance do **not** accept preservative / emulsifier / improve taste / make it fizzy	1
4(b)(ii)	any **one** from: • (artificial) flavourings • carbon dioxide • preservatives • plastic (bottle / cap)	 accept sugar / saccharine / glucose / sweetener / caffeine ignore other additives / tartrazine / quinoline yellow / sunset yellow	1
4(c)(i)	monomers polymers	 	1 1

Question 4 Continues on the next page

STEMUP.CO.UK

CHY1F

Question 4 continued

question	answers	extra information	mark
4(c)(ii)	any **two** from: • not enough space • not biodegradable • waste of resource / crude oil • could be recycled • can burn as a fuel to provide energy	ignore litter / global warming / animals / habitats accept not enough landfills **or** landfills are full / filling up allow crude oil is running out ignore reuse	2
Total			**9**

STEMUP.CO.UK

CHY1F

Question 5

question	answers	extra information	mark
5(a)(i)	A **and** 3 anomalous result	accept A **and** 39 independent mark accept not close to other two volumes **or** correct comparison using the results ignore does not fit the pattern	1 1
5(a)(ii)	any **one** from: • volume of water (used) • time (for water to run through) • temperature • mass / surface area of pad • same filter funnel	 allow amount of water (used) accept rate / speed (at which water runs through) accept amount / size / volume / thickness of pad ignore other equipment	1
5(a)(iii)	any **one** from: • incorrect / volume / amount of water added • reading / volume / amount of water collected • some water does not go through the pad • not enough time allowed for water to drain through • pads (from one company) not identical / faulty	ignore human error unqualified allow spillage / poorly placed pad accept rate / speed at which water is added	1

Question5 Continues on the next page

STEMUP.CO.UK

CHY1F

Question 5 continued

question	answers	extra information	mark
5(b)(i)	any **two** from: • it was not the best (at absorbing the water) • (needed) to absorb more (water) • to improve their image / sales	accept correct descriptions of 'not the best' / third best **or** only better than B allow not absorbing enough (water) accept *(*needs) to absorb more (water) than A and C for **2** marks	2
5(b)(ii)	any **one** from: • cost (more) • use (more) resources • use (more) energy	must relate to the company	1
Total			**7**

STEMUP.CO.UK

CHY1F

Question 6

question	answers	extra information	mark
6(a)(i)	condensed	it = water vapour accept temperature went below 100°C / boiling point of water allow cooled to form liquid / water / rain do **not** accept evaporated	1
	formed the oceans / seas	ignore rain accept (water vapour) cooled and formed the ocean / sea for **2** marks	1
6(a)(ii)	any **two** from: • used by (green) plants / *algae* • changed into oxygen • dissolved in oceans / seas • *(*locked up) in carbonates / sedimentary rocks • *(*locked up) in fossil fuels / named fossil fuel	ignore oxygen / nitrogen increased ignore reference to volcanoes / respiration accept photosynthesis / plants give out oxygen accept (locked up) in shells / skeletons (of animals)	2
6(b)(i)	cannot get to / reach / drill to / see the core	accept the core is (too) far down (into the Earth) / do not know what happens under the crust / Earth's surface accept it is (too) hot / radioactive ignore lack of evidence unqualified	1
6(b)(ii)	any **three** from: • heat / *energy* released • from radioactive decay / processes • (causing) convection currents • in the mantle	accept radioactivity / nuclear reactions	3
Total			**8**

STEMUP.CO.UK

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

General Certificate of Secondary Education
Foundation Tier
January 2010

Science B
Unit Chemistry C1

CHY1F

F

Chemistry
Unit Chemistry C1

Written Paper

Monday 18 January 2010 9.00 am to 9.45 am

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. Answers written in margins or on blank pages will not be marked.
- 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.

STEMUP.CO.UK

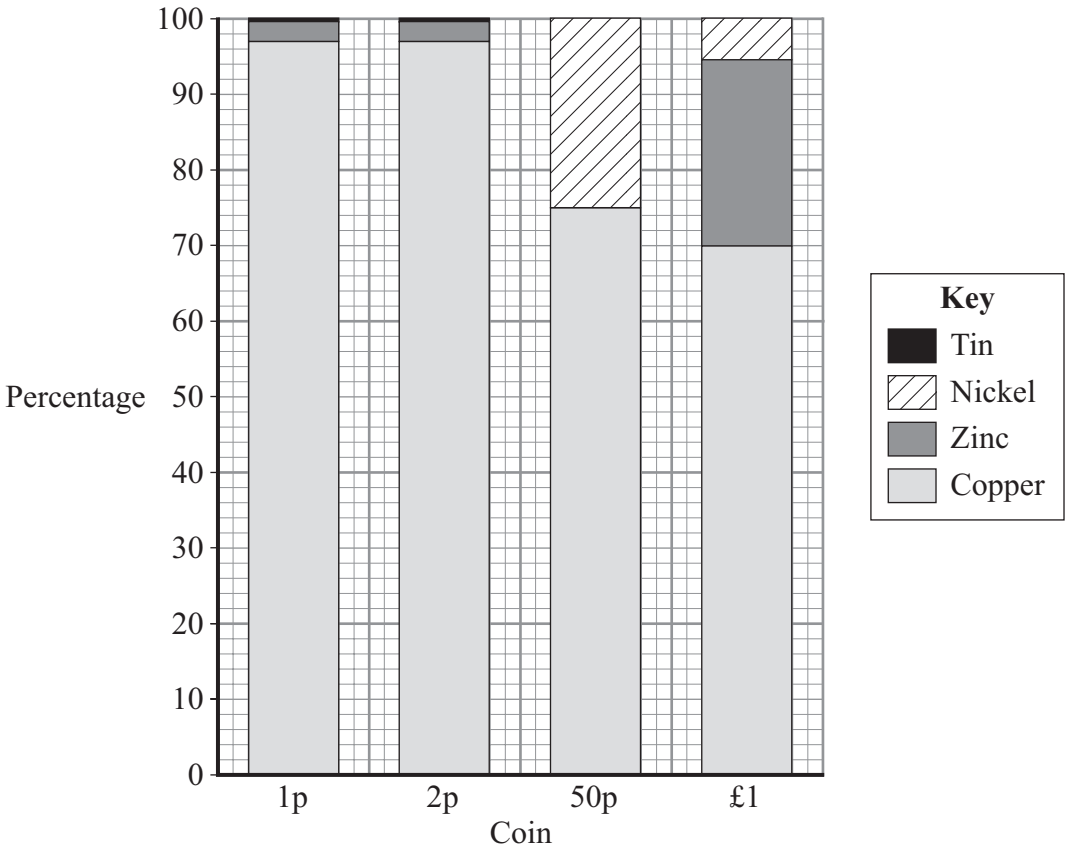
Areas outside the box will not be scanned for marking

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

1 This is the headline from a newspaper:

'Why is a 2p coin worth 3.3p?'

1 (a) The bar chart shows the percentages of metals in UK coins in 1991.



Use the bar chart to answer these questions.

1 (a) (i) Which metal is in all of these coins?

.....

(1 mark)

1 (a) (ii) Which coin does **not** contain zinc?

.....

(1 mark)

Areas outside the box will not be scanned for marking

1 (a) (iii) What is the percentage of nickel in a 50p coin?

Percentage = ... %

(1 mark)

1 (a) (iv) Draw a ring around the correct metal to complete the sentence.

Pure copper is too soft to be used for 1p and 2p coins.

Copper is mixed with zinc and | nickel | tin | iron | for 1p and 2p coins.

(1 mark)

1 (b) The value of the metal in 2p coins which were made in 1991 is now 3.3p.

1 (b) (i) Suggest why a 2p coin made in 1991 is worth 3.3p.

.....

.....

.....

(1 mark)

1 (b) (ii) Suggest why copper-plated steel is now used for 1p and 2p coins.

.....

.....

.....

(1 mark)

6

Turn over for the next question

Areas outside the box will not be scanned for marking

2 Read the article about strawberry milkshakes.

'Strawberry milkshakes without strawberries!'



To make strawberry milkshakes at home, all you need is ice-cream, strawberries and milk.

Fast-food strawberry milkshakes could contain 60 additives but no strawberries.
The fast-food strawberry milkshakes:

- are cheap
- keep for a long time
- have an enhanced flavour. For example they may taste sweet.

2 (a) (i) Suggest **one** reason why the strawberry milkshakes made at home may also contain additives.

.....

.....

(1 mark)

2 (a) (ii) State **one** reason why some fast-food strawberry milkshakes do **not** contain strawberries.

.....

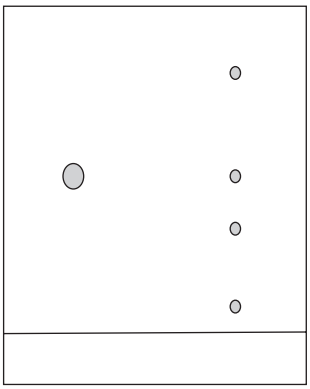
.....

(1 mark)

Areas outside the box will not be scanned for marking

2 (b) The additive E129, allura red, is often added to enhance the colour of strawberry milkshakes.

A student used chromatography to test if a strawberry milkshake contained E129. The result is shown.



2 (b) (i) How many colours are in this milkshake?

.....

(1 mark)

2 (b) (ii) The student concluded that the strawberry milkshake contained E129.

What evidence did the student use to make this conclusion?

.....

.....

(1 mark)

2 (b) (iii) Suggest why this conclusion may **not** be correct.

.....

.....

.....

(1 mark)

5

Turn over for the next question

Areas outside the box will not be scanned for marking

3 In 1980 Mount St Helens suddenly exploded. This volcanic eruption was so violent that it blew off the top of the mountain. Ash particles and volcanic gases spread throughout the Earth's atmosphere.



3 (a) Mount St Helens is on a boundary between two of the Earth's tectonic plates.

Draw a ring around the correct word to complete the sentences.

3 (a) (i) The Earth's tectonic plates are made up of the upper part of the mantle

and the | atmosphere. | core. | crust. |

(1 mark)

3 (a) (ii) The movement of the Earth's tectonic plates is caused by convection currents within the mantle. These convection currents are driven by heat released by

natural | combustion | radioactive | shrinking | processes.

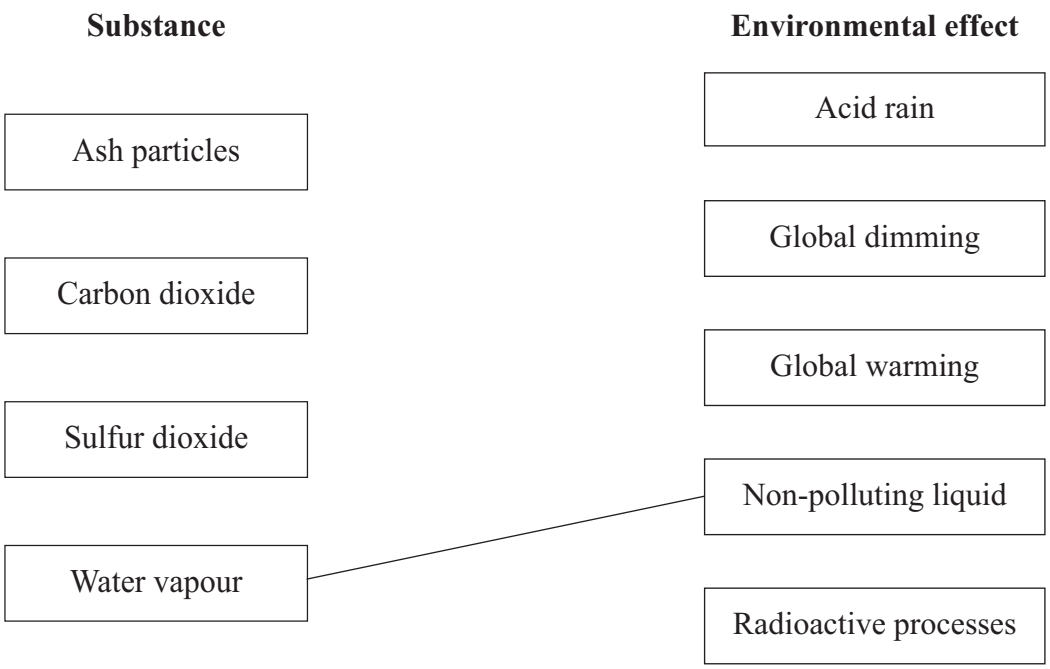
(1 mark)

Areas outside the box will not be scanned for marking

3 (b) The volcano released large amounts of ash particles, carbon dioxide, sulfur dioxide and water vapour.

Draw **one** straight line from each substance to an environmental effect that it causes.

One has been done for you.



(3 marks)

3 (c) Why do volcanic eruptions and earthquakes happen?

.....

.....

(1 mark)

6

Turn over for the next question

Areas outside the box will not be scanned for marking

4 Natural gas is mainly a hydrocarbon called methane.

4 (a) Use **one** word from the box to complete the sentence.

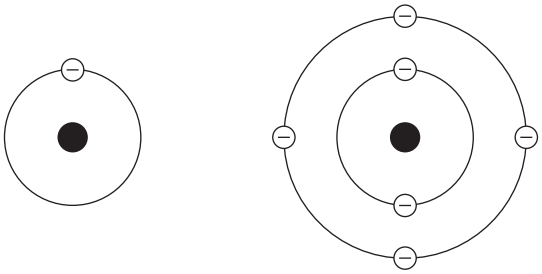
compounds	**elements**	**molecules**

Hydrocarbons contain hydrogen and carbon only.

Hydrogen and carbon are ..... .

(1 mark)

4 (b) The diagrams represent atoms of hydrogen and carbon.



Hydrogen Carbon

Draw a ring around the correct answer to complete the sentences.

4 (b) (i) The centre of each atom is called the

bond.
nucleus.
symbol.

(1 mark)

4 (b) (ii) The hydrogen atom has one electron and the carbon atom has

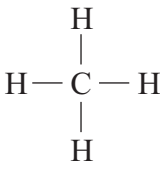
three
four
six

electrons.

(1 mark)

Areas outside the box will not be scanned for marking

4 (c) A molecule of methane can be represented as



Draw a ring around the correct answer to complete the sentences.

4 (c) (i) The formula of methane is

CH

CH_4

C_4H_4

(1 mark)

4 (c) (ii) The line between C—H is called a

bond.

molecule.

nucleus.

(1 mark)

4 (d) Methane burns to produce carbon dioxide (CO_2) and water (H_2O).

4 (d) (i) Draw a ring around the correct answer to complete the sentence.

When methane burns it reacts with

carbon.

nitrogen.

oxygen.

(1 mark)

4 (d) (ii) Hydrogen (H_2) can be used as a fuel.

Suggest why burning hydrogen would be less harmful to the environment than burning methane.

.....

.....

(1 mark)

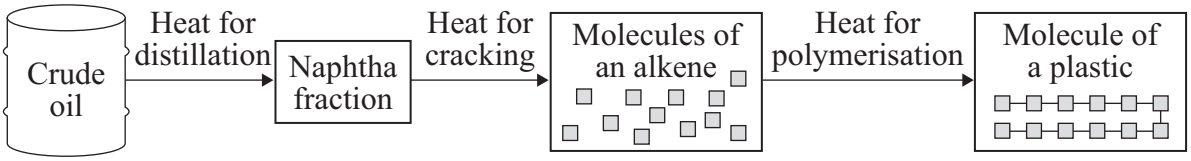
7

Turn over ▶

Areas outside the box will not be scanned for marking

5 Crude oil is used to make plastics.

5 (a) To make a plastic from crude oil involves many processes.



5 (a) (i) How do alkene molecules form a molecule of a plastic?

.....

.....

(1 mark)

5 (a) (ii) Suggest **one** of the main costs of making a plastic from crude oil.

.....

.....

(1 mark)

5 (a) (iii) Suggest **two** problems caused by the disposal of plastics in landfill sites.

1 .....

.....

2 .....

.....

(2 marks)

Areas outside the box will not be scanned for marking

5 (b) Some companies are using bio-plastics made from plants such as corn.
Less fossil fuel is used to make bio-plastics than is used to make plastics from crude oil.

Plastics made from plants would be more environmentally friendly than plastics made from crude oil.

Explain why.

.....

.....

.....

.....

(2 marks)

6

Turn over for the next question

Areas outside the box will not be scanned for marking

6 Rapeseed oil can be used for cooking.

A label on a bottle of rapeseed oil stated:

> Rapeseed oil is healthy because it is
>
> - low in saturated fat
> - high in poly-unsaturated fat.

Two students investigated if the statement was true. They found the following information about four oils.

	Rapeseed oil	**Sunflower oil**	**Olive oil**	**Corn oil**
Saturated fat (%)	6.6	12.0	14.3	14.4
Mono-unsaturated fat (%)	59.3	20.5	73.0	29.9
Poly-unsaturated fat (%)	29.3	63.3	8.2	51.3
Melting point (^{o}C)	5	–18	–12	–15

6 (a) Does this information support the two claims made on the label?
Explain your answers.

6 (a) (i) 'Rapeseed oil is low in saturated fat.'

.....

.....

.....

(1 mark)

6 (a) (ii) 'Rapeseed oil is high in poly-unsaturated fat.'

.....

.....

.....

(1 mark)

Areas outside the box will not be scanned for marking

6 (b) Rapeseed oil contains unsaturated fats.

How could the students test the oil to show that it contained unsaturated fats?

Test.....

.....

Result of test .....

.....

(2 marks)

6 (c) Rapeseed oil can be hardened by reacting it with hydrogen.

6 (c) (i) What would happen to the melting point of rapeseed oil if it was hardened?

.....

.....

(1 mark)

6 (c) (ii) One student claimed that hardening would make the rapeseed oil healthier.

Explain why the student is wrong.

.....

.....

.....

.....

.....

(2 marks)

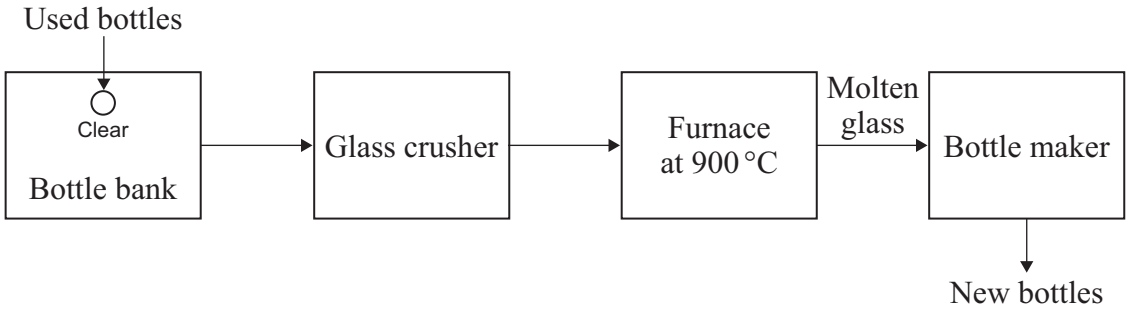
7

Turn over for the next question

Areas outside the box will not be scanned for marking

7 In recent years we have become more aware of the need to recycle glass.

7 (a) Used glass bottles can be recycled if they are put into bottle banks.



7 (a) (i) Suggest **one** reason why light bulbs should **not** be put into bottle banks.

.....

.....

(1 mark)

7 (a) (ii) Very few glass bottles are reused (used more than once).

Suggest **one** reason why.

.....

.....

(1 mark)

7 (a) (iii) New glass bottles can also be produced by heating, at 1700 °C, a mixture of the following raw materials:

sand (silicon dioxide), SiO_2
soda ash (sodium carbonate), Na_2CO_3
limestone (calcium carbonate), $CaCO_3$

Explain why the use of recycled glass to make glass bottles produces less carbon dioxide than making glass bottles from these raw materials.

.....

.....

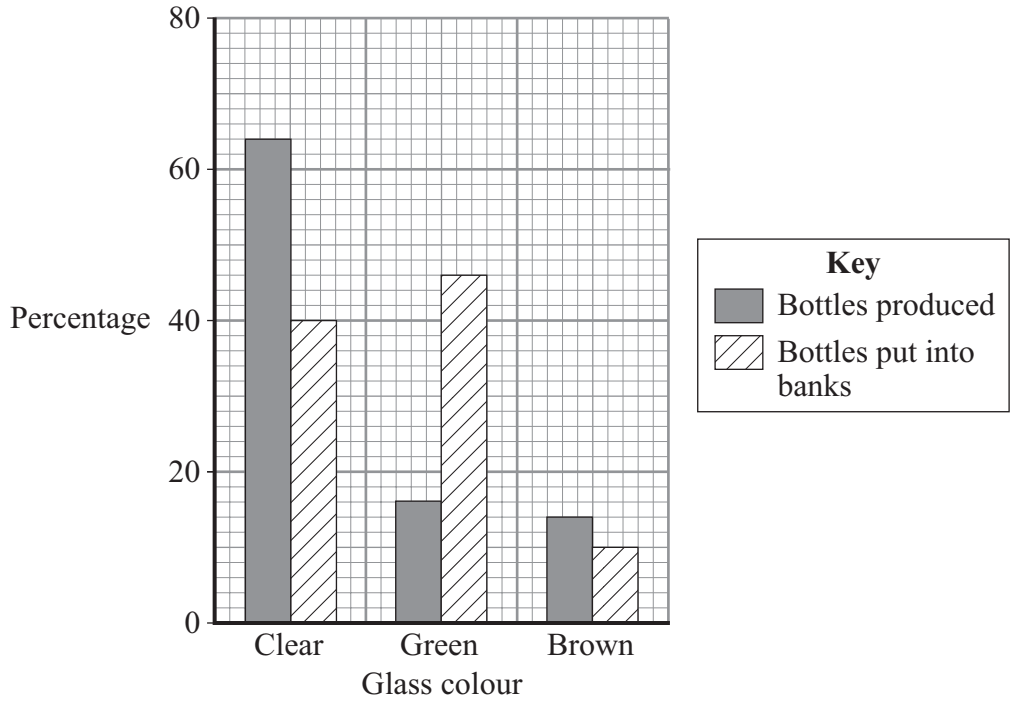
.....

.....

(2 marks)

Areas outside the box will not be scanned for marking

7 (b) The bar chart shows the percentages of glass bottles produced and the percentages of glass bottles put into bottle banks in the UK.



7 (b) (i) The percentage of green glass bottles produced is 16%.
What is the percentage of green glass bottles put into bottle banks?

Percentage = ... %

(1 mark)

7 (b) (ii) More green glass bottles are put into bottle banks than are made in the UK.
Suggest **one** reason why.

.....

.....

(1 mark)

7 (b) (iii) Suggest and explain **one** problem resulting from the percentage of clear glass bottles produced in the UK.

.....

.....

.....

.....

(2 marks)

8

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

Question 3 Photograph MOUNT ST. HELENS ERUPTION © CORBIS

Copyright © 2010 AQA and its licensors. All rights reserved.

Version : 09/03/2010

General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Mark Scheme

2010 examination – January series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2010 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

CHY1F

Question 1

question	answers	extra information	mark
1(a)(i)	copper / Cu		1
1(a)(ii)	50(p)		1
1(a)(iii)	25		1
1(a)(iv)	tin		1
1(b)(i)	any **one** from: • high cost of copper • less copper available ***or*** (copper ores exhausted / **only** low-grade ores available) • high demand for copper • high percentage (%) of copper in the coin • inflation (of cost)	allow metal is expensive allow copper is non-renewable	1
1(b)(ii)	any **one** from: • stronger / harder • cost of copper **or** copper is more expensive to extract **or** steel is cheap • less copper available **or** (copper ores exhausted / **only** low-grade ores available) • high demand for copper • less copper is needed	ignore rust allow cheaper (to make)	1
Total			**6**

STEMUP.CO.UK

CHY1F

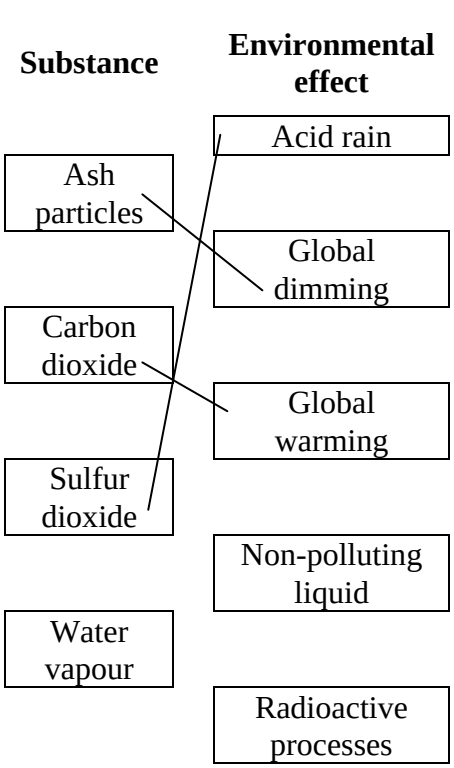
Question 2

question	answers	extra information	mark
2(a)(i)	any **one** from: • ice-cream (has additives) • milk (has additives) • strawberries (could contain additives) • additives, such as a sweetener or colour may have been added	accept ingredients (may contain additives)	1
2(a)(ii)	any **one** from: • cheaper • keeps longer • additives used for the strawberry flavour • saves time	accept strawberries are expensive accept strawberries do not keep accept strawberries can cause an allergic reaction	1
2(b)(i)	4 / four		1
2(b)(ii)	dot / colour / E129 / allura red match	ignore chromatography (test)	1
2(b)(iii)	any **one** from: • none of the colours / dots in the milkshake may be caused by E129 / allura red • dot is not the same size • only did one test	accept the matching dot may be caused by another / similar colour accept this could be an anomalous result	1
Total			**5**

STEMUP.CO.UK

CHY1F

Question 3

question	answers	extra information	mark
3(a)(i)	crust		1
3(a)(ii)	radioactive		1
3(b)		all three correct = **3** marks two correct = **2** marks one correct = **1** mark extra line from a statement cancels the mark	3
3(c)	any **one** from: • (tectonic) plates move • faults / plate boundaries • weaknesses in the (Earth's) crust	idea of movement is required	1
Total			**6**

STEMUP.CO.UK

CHY1F

Question 4

question	answers	extra information	mark
4(a)	elements		1
4(b)(i)	nucleus		1
4(b)(ii)	six		1
4(c)(i)	CH_4		1
4(c)(ii)	bond		1
4(d)(i)	oxygen		1
4(d)(ii)	any **one** from: • (water) does not pollute • (only) water is produced • no carbon dioxide / monoxide (is produced)	 accept no harmful gas(es) allow less pollution accept no greenhouse gas(es) / effect **or** no global warming	1
Total			**7**

STEMUP.CO.UK

CHY1F

Question 5

question	answers	extra information	mark
5(a)(i)	any **one** from: • bond / join (together) • double bond opens	ignore polymerisation / heat	1
5(a)(ii)	any **one** from: • heat / energy • cost of fuels / the crude oil • construction of the factory / plant • wages / salaries	ignore many processes / distillation / cracking / polymerisation	1
5(a)(iii)	any **two** from: • non-biodegradable • landfill sites are filling up / limited • waste of a resource / could be recycled / reused	ignore gases released / burning / habitats accept remains a long time accept land / space used up accept crude oil is running out	2
5(b)	any **two** from: • renewable / sustainable • less fuel <u>burned</u> • biodegradable • <u>natural</u> resource • plants absorb carbon dioxide	ignore recycling ignore crude oil is running out accept less energy / heat needed	2
Total			**6**

STEMUP.CO.UK

CHY1F
Question 6

question	answers	extra information	mark
6(a)(i)	(yes as it) has the lowest / least (%)	ignore no accept it is only 6.6(%) accept any correct comparisons	1
6(a)(ii)	(no as it) any **one** from: • is second lowest • is 'medium' • is (only) third highest • depends on which oil it is compared with	ignore yes ignore it is only 29.3% accept neither high or low accept not the highest accept any correct comparison accept it has more mono – unsaturated fat	1
6(b)	(test) add bromine / iodine (solution) (result) turns colourless / decolourises	ignore bromide / iodide ignore colours ignore clear ignore changes colour	1 1
6(c)(i)	increase(s) / gets higher	ignore boiling point	1
6(c)(ii)	would increase the saturated (fat) **or** reduce the unsaturated (fat) saturated (fat) is not / less healthy **or** unsaturated (fat) is healthy	idea of increase is required idea of reduction is required accept hydrogenated (fat) is not / less healthy accept bad for you **or** causes heart disease accept good for you eg it would not make it healthier = **0** marks it would not make it healthier because it is saturated(fat) = **2** marks	1 1
Total			**7**

CHY1F

STEMUP.CO.UK

Question 7

question	answers	extra information	mark
7(a)(i)	any **one** from: • contain metals / filaments / wires • contain other / toxic chemicals / materials • different type of glass	ignore contamination without explanation accept named metal(s) accept named chemical(s) / material(s) accept glass would not melt ignore thicker / thinner glass	1
7(a)(ii)	any **one** from: • (glass bottles are) recycled • need to be more expensive glass **or** strong / thicker / different glass (to be reused) • damaged / weaker (with reuse) • need to be cleaned / transported • different sizes / shapes / colours • no refunds paid	 accept made to be used only once accept glass bottles are made of readily available materials **or** thin / cheap glass accept need to be sorted	1
7(a)(iii)	any **two** from: • low / less energy / heat or lower temperature needed • low / less fuel burned • no (carbon dioxide) from carbonate(s)	allow converse arguments ignore no energy without explanation ignore no fuel without explanation accept less fuel for extraction / transportation of raw materials accept name(s) of this carbonate(s)	2
7(b)(i)	46		1

Question 7 continues on the next page…

STEMUP.CO.UK

CHY1F

Question 7 continued

question	answers	extra information	mark
7(b)(ii)	any **one** from: • (more) imported (as wine bottles) • not much green glass made in the UK • not a high demand (for green glass)	accept come from / made in other countries **or** made elsewhere	1
7(b)(iii)	any **two** from: • more (clear) glass is produced (64%) than recycled (40%) • (clear) glass going to landfill • (more) raw materials needed / extracted / quarried • (more) heat / energy / fuel would be needed • (more) carbon dioxide produced	accept not enough (clear) glass is recycled allow 'thrown away' ignore they will run out accept high carbon footprint / carbon emissions **or** global warming	2
Total			**8**

STEMUP.CO.UK

Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature								

For Examiner's Use

General Certificate of Secondary Education
June 2009

SCIENCE B
Unit Chemistry C1

CHY1F

F

CHEMISTRY
Unit Chemistry C1

Foundation Tier

Wednesday 17 June 2009 9.00 am to 9.45 am

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. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- 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.

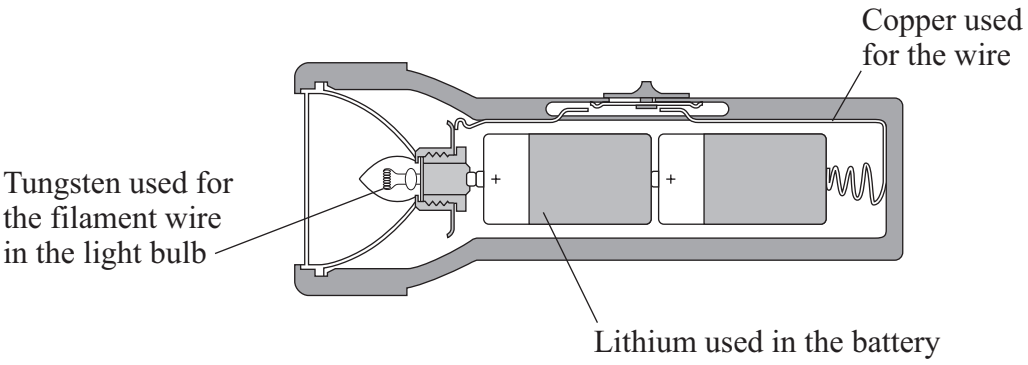
For Examiner's Use			
Question	Mark	Question	Mark
1		6	
2		7	
3			
4			
5			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

STEMUP.CO.UK

Areas outside the box will not be scanned for marking

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

1 The diagram shows a circuit that is used in a torch. Electrons flow through this circuit.

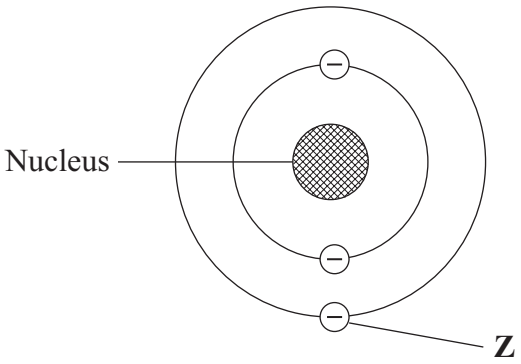


1 (a) Why is copper used for the wire?

.....

(1 mark)

1 (b) The diagram shows the structure of an atom of lithium.



Name the particle labelled **Z**.

.....

(1 mark)

Areas outside the box will not be scanned for marking

1 (c) The table shows some properties of the metals used in the electrical circuit.

Metal	Melting point in °C	Boiling point in °C	Reaction with oxygen
Copper	1083	2582	Reacts **slowly** to form a thin oxide layer on surface
Lithium	179	1317	Reacts **rapidly** to form oxide
Tungsten	3370	5930	Reacts **only** when very hot to form oxide

1 (c) (i) Use information from the table to suggest the order of reactivity for copper, lithium and tungsten.

most reactive .....

.....

least reactive .....

(2 marks)

1 (c) (ii) The filament wire glows because it gets very hot.

Use information from the table to suggest **one** reason why tungsten is used for the filament wire in the light bulb.

.....

.....

(1 mark)

1 (d) The gas used in the light bulb is argon.

Draw a ring around the correct word in the box to complete the sentence.

Argon is used in the light bulb because it is

dense.
solid.
unreactive.

(1 mark)

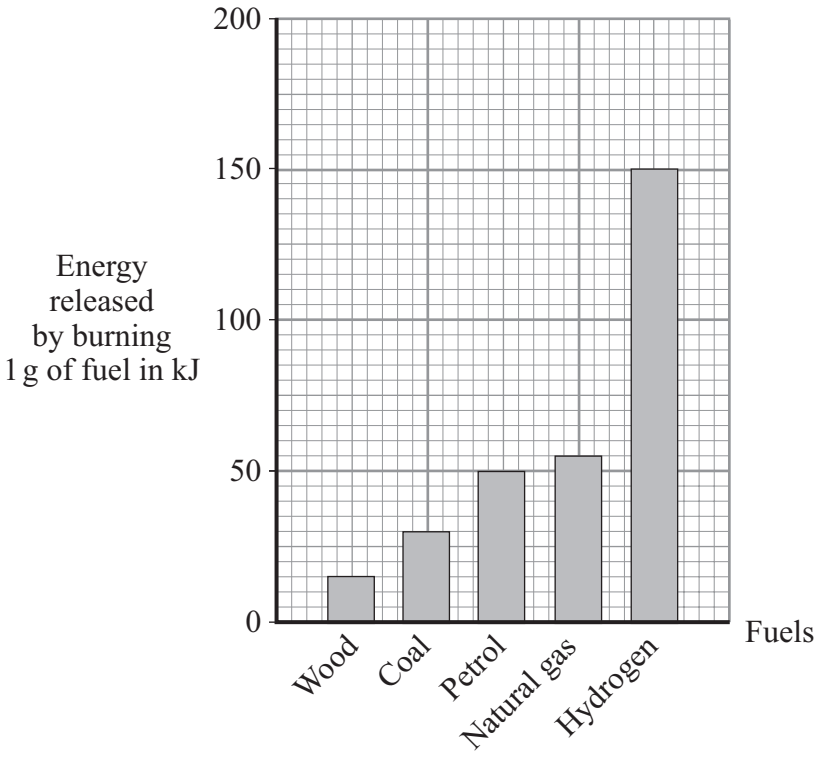
6

Turn over ▶

Areas outside the box will not be scanned for marking

2 Energy is released by burning fuels.

2 (a) The bar chart shows the energy in kilojoules, kJ, released by burning 1 g of five different fuels.



2 (a) (i) Which fuel releases the least energy from 1 g?

.....

(1 mark)

2 (a) (ii) How much energy is released by burning 1 g of coal?

Energy = ... kJ

(1 mark)

2 (a) (iii) Coal burns in oxygen and produces the gases shown in the table.

Name	**Formula**
Carbon dioxide	CO_2
Water vapour	H_2O
Sulfur dioxide	SO_2

Use information from the table to name **one** element that is in coal.

.....

(1 mark)

Areas outside the box will not be scanned for marking

2 (a) (iv) Use information from the bar chart to calculate the mass of petrol that will release the same amount of energy as 1g of hydrogen.

.....

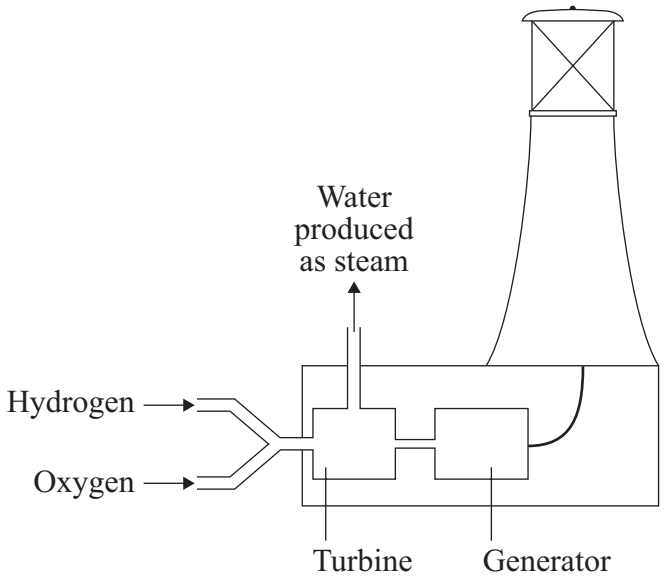
.....

Mass = ... g

(1 mark)

2 (b) Hydrogen can be made from fossil fuels.
Hydrogen burns rapidly in oxygen to produce water only.

A lighthouse uses electricity generated by burning hydrogen.



2 (b) (i) Use information from the bar chart and the diagram above to suggest **two** advantages of using hydrogen as a fuel.

1 .....

.....

2 .....

.....

(2 marks)

2 (b) (ii) Suggest **one** disadvantage of using hydrogen.

.....

(1 mark)

7

Turn over ▶

Areas outside the box will not be scanned for marking

3 This is part of a food label.

'A diet low in fat, particularly saturated fat, could help to maintain a healthy heart.'

Nutritional information table:

	Per 100 g
Total fat	77.6 g
of which: saturated	11.2 g
unsaturated	66.4 g

Also contains colourings

3 (a) (i) Why is this food described as 'healthy'?

.....

.....

(1 mark)

3 (a) (ii) Draw a ring around the correct word in the box to complete the sentence.

Unsaturated fat can be detected by reacting it with

bromine.
hydrogen.
sulfur.

(1 mark)

3 (b) Liquid fats are called oils. Oil and water can be shaken together to make a mixture.

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

3 (b) (i) The mixture of oil and water can be prevented

from separating by adding

a colouring.
an emulsifier.
a preservative.

(1 mark)

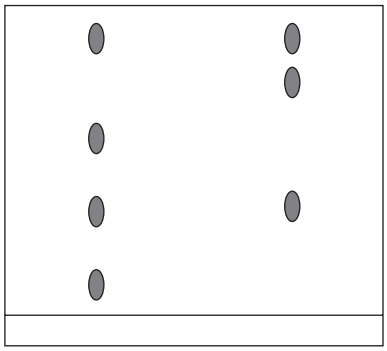
3 (b) (ii) Compared with either oil or water the mixture has a better

shelf life.
smell.
texture.

(1 mark)

Areas outside the box will not be scanned for marking

3 (c) The result of a process used to detect and identify the colours in two foods, **A** and **B**, is shown.



Food **A** Food **B**

3 (c) (i) Describe the differences between the colours used in food **A** and food **B**.

.....

.....

.....

.....

(2 marks)

3 (c) (ii) Tick (✓) the name of the process used to detect and identify colours in food.

Process	(✓)
chromatography	
extraction	
hardening	

(1 mark)

7

Turn over ▶

Areas outside the box will not be scanned for marking

4 Billions of years ago, the Earth's early atmosphere was probably like the atmosphere of Venus today.

The table shows a comparison of the atmospheres of the Earth and Venus today.

	Percentage composition of atmosphere	
Name of gas	**Earth today**	**Venus today**
Nitrogen	78	3.5
Oxygen	21	a trace
Argon	0.97	a trace
Carbon dioxide	0.03	96.5
Average surface temperature	20 °C	460 °C

4 (a) Use the names of gases from the table to complete the sentences.

4 (a) (i) In the Earth's atmosphere today, the main gas is ..... .

(1 mark)

4 (a) (ii) In the Earth's atmosphere billions of years ago, the main gas was

..... .

(1 mark)

4 (b) (i) Scientists do **not** know the accurate composition of the Earth's early atmosphere. Suggest why.

.....

.....

(1 mark)

4 (b) (ii) Use information from the table to answer this question.

Water vapour is present in the atmospheres of the Earth and Venus today.
The Earth's surface is mainly covered by water.

Suggest why there is no water on the surface of Venus.

.....

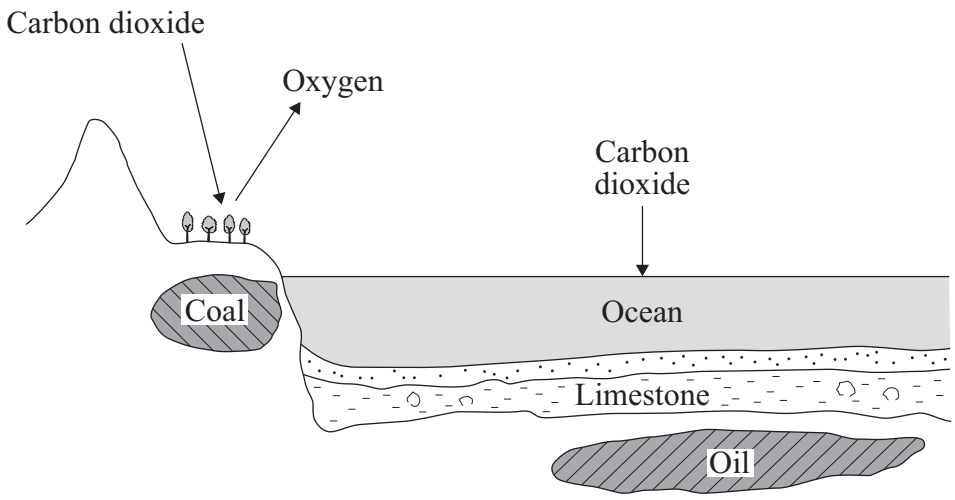
.....

(1 mark)

STEMUP.CO.UK

Areas outside the box will not be scanned for marking

4 (c) The diagram shows how carbon dioxide is removed from the Earth's atmosphere.



Describe what happened to the carbon dioxide in the Earth's early atmosphere. Use the diagram to help you.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

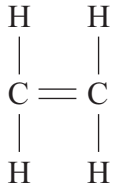
7

Turn over for the next question

Areas outside the box will not be scanned for marking

5 Crude oil is used to make useful substances such as alkenes and plastics.

5 (a) The alkene shown is ethene.



5 (a) (i) Tick (✓) the correct formula for ethene.

Formula	**(✓)**
CH_4	
C_2H_4	
C_2H_6	

(1 mark)

5 (a) (ii) Tick (✓) the name of the plastic formed when many ethene molecules join together.

Name of plastic	**(✓)**
Poly(ethene)	
Poly(ethanol)	
Poly(propene)	

(1 mark)

Areas outside the box will not be scanned for marking

5 (b) Read the article about plastics and then answer the questions.

THE PROBLEM WITH PLASTIC WASTE

The UK produces about 3 million tonnes of plastics from crude oil every year.
Most of the litter found on UK beaches is plastic waste.
80% of the plastics produced end up in landfill sites.
The UK recycles only 7% of plastic waste.

5 (b) (i) Draw a ring around the correct answer in the box to complete the sentence.

Litter that is plastic waste needs to be removed from beaches

because it

- decomposes.
- is flammable.
- is not biodegradable.

(1 mark)

5 (b) (ii) Suggest a problem caused by 80% of the plastics going to landfill sites.

.....

.....

(1 mark)

5 (b) (iii) The UK government has set a target to recycle 30% of plastic waste.

How are resources saved by recycling more plastics?

.....

.....

(1 mark)

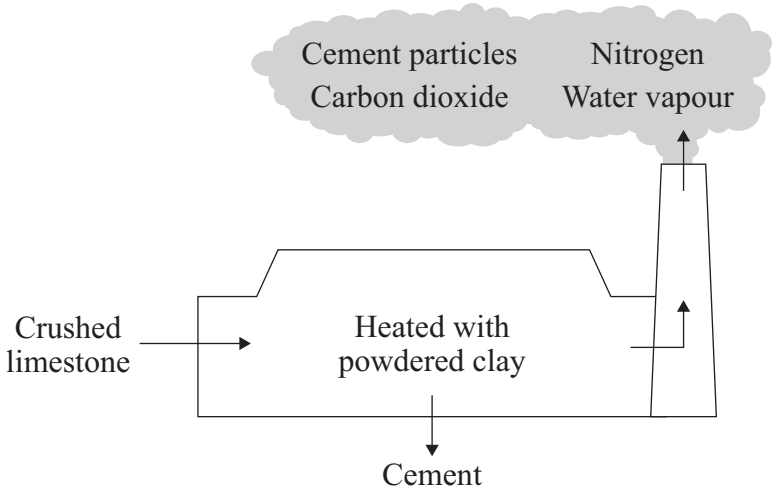
5

Turn over for the next question

Areas outside the box will not be scanned for marking

6 A limestone quarry is in an area of natural beauty and near several villages.
The company operating the quarry wants planning permission to build a new cement works in the quarry.

The diagram shows some of the substances used and produced at a cement works.



6 (a) Limestone is mainly calcium carbonate, $CaCO_3$.
Write the correct number in the box to complete each sentence.

6 (a) (i) The formula shows that calcium carbonate, $CaCO_3$,

contains ☐ different elements.

(1 mark)

6 (a) (ii) Calcium carbonate, $CaCO_3$, contains a total number of ☐ atoms.

(1 mark)

6 (b) The company wants the new cement works because the nearest cement works is 100 km from the quarry. The company argues that a new cement works sited inside the quarry would reduce carbon dioxide emissions.

Suggest why the new cement works might reduce carbon dioxide emissions.

.....

.....

.....

(1 mark)

Areas outside the box will not be scanned for marking

6 (c) Residents from the villages near the quarry are concerned that there will be atmospheric pollution from the new cement works.

6 (c) (i) Name and explain how **one** of the emissions from the chimney causes atmospheric pollution.

Name of emission: .....

Explanation: .....

.....

(2 marks)

6 (c) (ii) Suggest what the company could do to reduce this atmospheric pollution.

.....

.....

(1 mark)

6

Turn over for the next question

Areas outside the box will not be scanned for marking

7 (a) Limestone is a hard rock that is used as a building material.
Limestone was used by the Egyptians to make plaster.

Reaction 1 – calcium carbonate, $CaCO_3$, was decomposed by heating limestone

$$CaCO_3 \rightarrow CaO + CO_2$$

Reaction 2 – water was added to the solid produced to make slaked lime

$$CaO + H_2O \rightarrow Ca(OH)_2$$

Reaction 3 – a mixture of slaked lime and water was used as plaster. After the plaster had set it became even harder with age

$$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$$

7 (a) (i) Name the solid formed when calcium carbonate decomposed.

.....

(1 mark)

7 (a) (ii) Use the reactions to explain how the plaster became even harder with age.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

Areas outside the box will not be scanned for marking

7 (b) A gardener wanted to make a step up to his greenhouse door. He decided to use a mixture of cement and sand to make mortar.

He experimented using mixtures with different cement to sand ratios.

- The mortar mixtures were put in the same sized mould.
- Each mortar mixture was allowed to set hard.
- He then dropped a metal ball from increasing heights until the set mortar cracked.
- He recorded his results in a table.

Volume of sand in cm^3	Volume of cement in cm^3	Height the metal ball dropped to crack the set mortar in cm
800	100	17
700	100	24
600	100	30
500	100	36
400	100	37
300	100	48
200	100	54

7 (b) (i) What is the relationship between the volume of sand and the strength of the mortar?

.....

.....

(1 mark)

7 (b) (ii) The gardener was not sure about some of his results.

Use the results to explain why.

.....

.....

.....

.....

.....

(2 marks)

7

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright © 2009 AQA and its licensors. All rights reserved.

Version 1.0: 21.07

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit 1 Chemistry

Mark Scheme

2009 examination – June series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2009 AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

STEMUP.CO.UK

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

STEMUP.CO.UK

CHY1F

Question 1

question	answers	extra information	mark
1(a)	conducts (electricity) **or** allows electrons / current to flow	accept flexible ignore conducts heat	1
1(b)	electron		1
1(c)(i)	lithium>copper>tungsten **or** Li>Cu>W	all correct allow **1** mark for one metal in the correct position	2
1(c)(ii)	has high / highest melting point **or** can withstand the highest temperature	accept has high / highest boiling point	1
1(d)	unreactive		1
Total			**6**

STEMUP.CO.UK

CHY1F

Question 2

question	answers	extra information	mark
2(a)(i)	wood		1
2(a)(ii)	30 (kJ)		1
2(a)(iii)	carbon / C **or** hydrogen / H **or** sulfur / S **or** oxygen / O		1
2(a)(iv)	3 / three (g)		1
2(b)(i)	releases most energy	accept releases a lot of energy / burns rapidly ignore references to cost	1
	no harmful gases / no or less pollution formed / no global warming / no climate change / no greenhouse gas	accept produces water (only) /steam accept does **not** produce sulfur dioxide / carbon dioxide / carbon monoxide / particles / smoke	1

Question 2 continues on the next page…

STEMUP.CO.UK

CHY1F

Question 2 Continued

question	answers	extra information	mark
2(b)(ii)	any **one** from: • expensive • difficult to produce • not available in large quantities • explosive / dangerous • not a natural fuel / resource • made from fossil fuels • difficult to store	 accept large volume needed allow will run out / non-renewable	1
Total			**8**

STEMUP.CO.UK

CHY1F

Question 3

question	answers	extra information	mark
3(a)(i)	any **one** from: • does not contain much saturated fat **or** low in saturated fat • contains a lot of unsaturated fat **or** high in unsaturated fat	accept correct use of figures to compare the amount of fat to the total amount of fat	1
3(a)(ii)	bromine		1
3(b)(i)	an emulsifier		1
3(b)(ii)	texture		1
3(c)(i)	any **two** from: • **A** has four colours • **B** has three colours • **A / B** have two colours the same • **B** has one different colour	if first two bullets not stated accept **A** has more colours (than **B**) **or B** has less colours (than **A**) for **1** mark only	2
3(c)(ii)	chromatography		1
Total			**7**

STEMUP.CO.UK

CHY1F

Question 4

question	answers	extra information	mark
4(a)(i)	nitrogen / N_2		1
4(a)(ii)	carbon dioxide / CO_2		1
4(b)(i)	humans / scientists had not evolved	accept it was billions / millions of years ago allow too long ago	1
4(b)(ii)	temperature is above 100°C **or** any water would evaporate / boil	accept Venus is too hot	1
4(c)	any **three** from: • used by <u>plants</u> • used for <u>photosynthesis</u> • <u>dissolves</u> in oceans / seas • used to form the shells / skeletons of marine organisms • <u>locked up</u> as limestone / carbonates • <u>locked up</u> as fossil fuels / oil / coal	accept <u>plants take in carbon dioxide and give out oxygen</u> for the first two bullet points ie **2** marks allow absorbs into oceans / seas	3
Total			**7**

STEMUP.CO.UK

CHY1F

Question 5

question	answers	extra information	mark
5(a)(i)	C_2H_4		1
5(a)(ii)	poly(ethene)		1
5(b)(i)	is not biodegradable		1
5(b)(ii)	not enough landfill sites / space	accept landfill sites are filling up **or** plastics remain for <u>years</u> **or** plastics not broken down ignore cost / waste of resources / not biodegradable / wildlife	1
5(b)(iii)	less (crude) oil / fuels / energy used	accept (crude) <u>oil</u> is a non-renewable resource	1
Total			**5**

STEMUP.CO.UK

CHY1F

Question 6

question	answers	extra information	mark
6(a)(i)	3 / three		1
6(a)(ii)	5 / five		1
6(b)	any **one** from: • less / no transport • less / no (fossil) fuel used	 accept less / no distance ignore references to carbon dioxide / carbon emissions	1
6(c)(i)	carbon dioxide / CO_2 (causes) global warming / climate change / greenhouse gas **or** (cement) particles / smoke (1) (causes) asthma / dust / (global) dimming (1) **or** sulfur dioxide / SO_2 / nitrogen oxides / NO_x (1) (causes) acid rain (1)	for a correct emission explanation must be correct for named emission ignore ozone layer accept breathing problems do **not** accept nitrogen or water vapour for emissions do **not** accept no named emission	1 1

Question 6 continues on the next page…

STEMUP.CO.UK

CHY1F

Question 6 Continued

question	answers	extra information	mark
6(c)(ii)	absorb / trap / capture / filter / pass through water / scrub / electrostatic attraction	ignore condense / off setting / different fuel	1
Total			**6**

STEMUP.CO.UK

CHY1F

Question 7

question	answers	extra information	mark
7(a)(i)	calcium oxide / quicklime	allow calcium monoxide do **not** accept calcium dioxide ignore chemical formulae	1
7(a)(ii)	any **three** from: • carbon dioxide / CO_2 • (carbon dioxide) reacts (with the calcium hydroxide / slaked lime / plaster) • limestone / calcium carbonate / $CaCO_3$ forms • water is lost / evaporates	it = plaster allow reaction 3 identified do **not** allow incorrect reaction ignore mixes, unless they state the correct product allow marble / chalk allow moisture ignore dries	3
7(b)(i)	as the amount / volume of sand decreases the strength of the mortar increases	accept as sand decreases the mortar is stronger / harder to crack allow as sand decreases the mortar increases allow converse ignore references to height of metal ball	1

Question 7 continues on the next page…

STEMUP.CO.UK

CHY1F

Question 7 Continued

question	answers	extra information	mark
7(b)(ii)	any **two** from: • 400 / 5th result is anomalous • the interval between the others is similar or the interval is about 6/7 • he has only one set of results	accept two results (36 and 37 / 400 and 500 / 4th and 5th) are almost the same accept result at 400 should be 42 allow the other results fit a pattern / are on a straight line allow he has only done it once ignore reliable	2
Total			**7**

STEMUP.CO.UK

Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature								

For Examiner's Use

General Certificate of Secondary Education
January 2009

SCIENCE B **CHY1F**
Unit Chemistry C1

F

CHEMISTRY
Unit Chemistry C1

Foundation Tier

Thursday 15 January 2009 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. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- 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.

For Examiner's Use			
Question	Mark	Question	Mark
1		5	
2		6	
3			
4			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

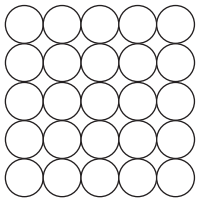
STEMUP.CO.UK

Areas outside the box will not be scanned for marking

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

1 Iron is the main structural metal used in the world.

1 (a) The diagram represents the particles in iron, Fe.



Draw a ring around the correct word in the box to complete the sentence.

Iron is described as an element because all the

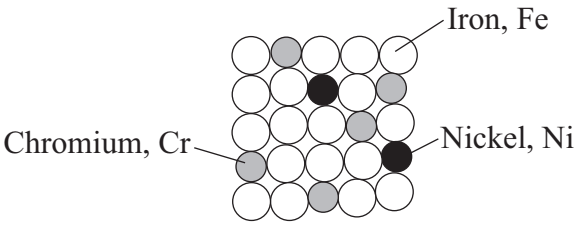
atoms
compounds
metals

are the same.

(1 mark)

1 (b) Stainless steel is mostly iron.

The diagram represents the particles in stainless steel.



Areas outside the box will not be scanned for marking

1 (b) Use the correct words from the box to complete the sentences about alloys.

metal	**mixture**	**molecule**	**polymer**	**smart**	**structure**

Stainless steel is an alloy because it is a .....

of iron, chromium and nickel.

An alloy is made up of more than one type of ..... .

Stainless steel alloys are harder than iron because the different sized atoms added

change the ..... .

An alloy that can return to its original shape after being deformed is called a

..... alloy. *(4 marks)*

1 (c) In the UK, we use about 1.8 billion steel cans every year but only 25% are recycled. Used steel cans are worth about £100 per tonne.

Recycling saves raw materials and reduces waste that would end up in landfill. Producing steel by recycling used cans saves 75% of the energy that would be needed to produce steel from iron ore. This also reduces carbon dioxide emissions.

1 (c) (i) Give **two** reasons, from the information above, to explain why recycling used steel cans is a good idea.

1 .....

.....

2 .....

.....

(2 marks)

1 (c) (ii) Suggest how the local council could increase the percentage of used steel cans that are recycled.

.....

.....

(1 mark)

8

Turn over ▶

Areas outside the box will not be scanned for marking

2 Limestone has been called the Earth's most useful rock.

2 (a) Limestone contains calcium carbonate, $CaCO_3$.

2 (a) (i) Complete the table to show the number of atoms of each element in the formula of calcium carbonate.

Calcium has been done for you.

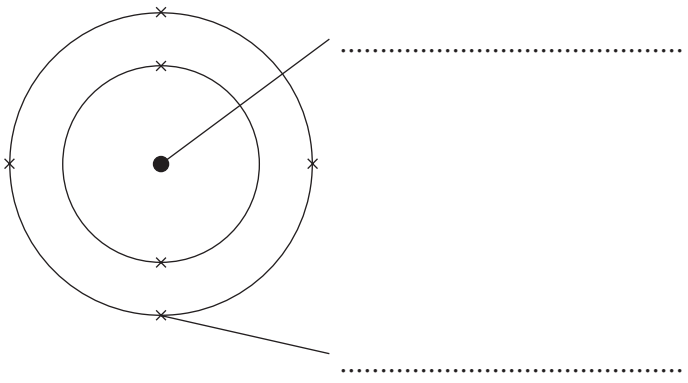
Element	**Number of atoms in the formula $CaCO_3$**
Calcium, Ca	1
Carbon, C	
Oxygen, O	

(2 marks)

2 (a) (ii) The diagram below represents a carbon atom.

Use words from the box to label the parts of this atom.

bond	**electron**	**molecule**	**nucleus**



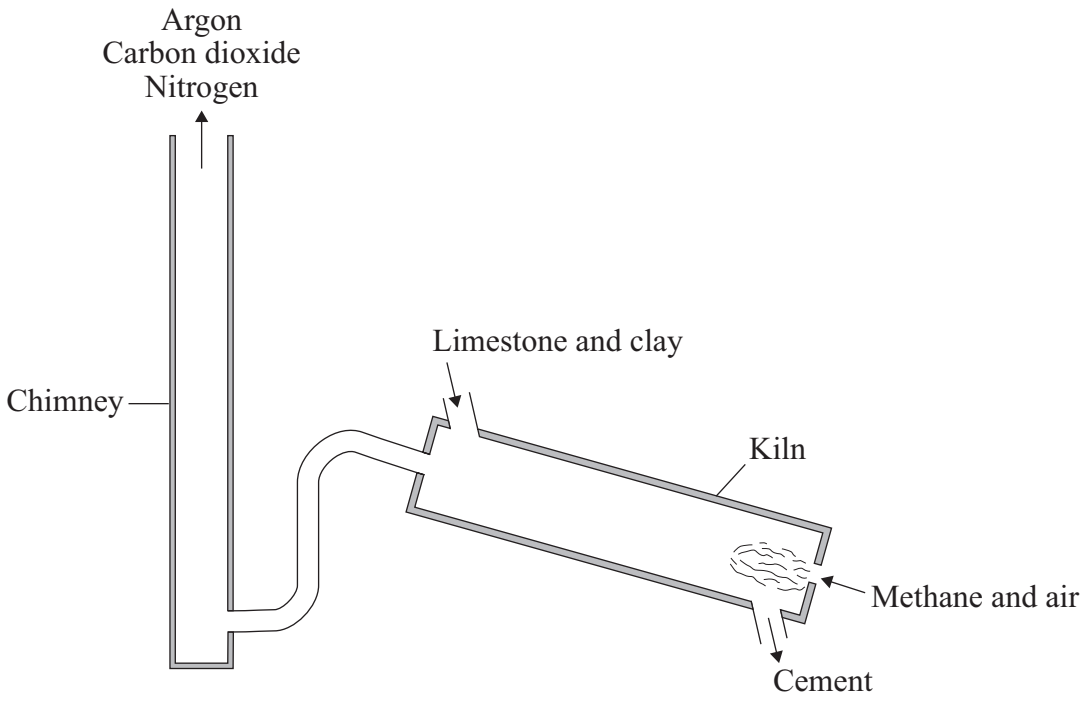
.....

.....

(2 marks)

Areas outside the box will not be scanned for marking

2 (b) At a cement works, limestone is mixed with clay and heated in a kiln.



Use the information in the diagram to answer these questions.

2 (b) (i) Name the fuel that is used to heat the limestone and clay.

.....

(1 mark)

2 (b) (ii) Limestone contains calcium carbonate, $CaCO_3$.
Draw a ring around the correct gas in the box to complete the sentence.

The gas formed when calcium carbonate decomposes is

argon.
carbon dioxide.
nitrogen.

(1 mark)

Question 2 continues on the next page

Turn over ▶

Areas outside the box will not be scanned for marking

2 (c) The cement works starts to burn a different fuel.

Local residents are concerned because more children are suffering asthma attacks. Residents have also noticed that parked cars are becoming dirty because of smoke particles from the chimney.

The table shows the possible medical risk from smoke particles.

Particle size in mm	Medical effect
Larger than 0.4	No medical risks known
0.3 and smaller	Causes asthma attacks
0.2 and smaller	May cause cancer

2 (c) (i) Give **two** reasons why local residents are concerned about the cement works burning a different fuel.

1 .....

.....

2 .....

.....

(2 marks)

2 (c) (ii) The company operating the cement works stated that smoke particles from the chimney had not changed since it started burning the different fuel.

If you were a local resident, what evidence would you like to see to help you decide if the company's statement is true or not?

.....

.....

.....

.....

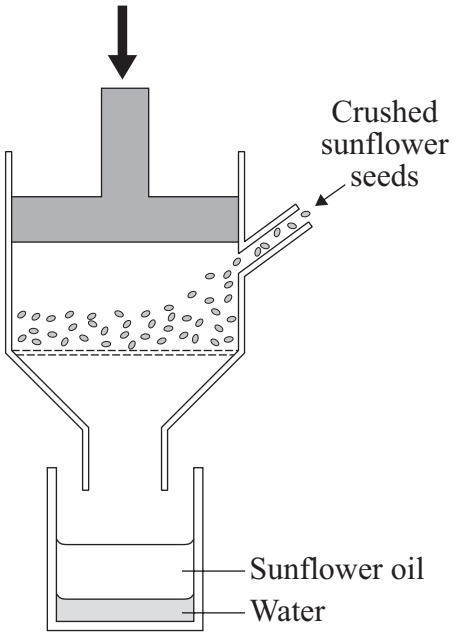
(2 marks)

10

Areas outside the box will not be scanned for marking

3 An advert for crisps claims that they now contain only 30% saturated fat because they are cooked in sunflower oil.

3 (a) The oil is extracted from sunflower seeds. The diagram shows how this can be done.



Draw a ring around the correct word in each box to complete the sentences.

3 (a) (i) The oil is obtained from crushed sunflower seeds by

evaporating.
filtering.
pressing.

(1 mark)

3 (a) (ii) The oil does not

burn
dissolve
melt

in water.

(1 mark)

Question 3 continues on the next page

Areas outside the box will not be scanned for marking

3 (b) Draw a ring around the correct word in the box to complete the sentence.

Carbon carbon double bonds in sunflower oil can be detected

by reacting with

bromine.
iron.
oxygen.

(1 mark)

3 (c) Water has a boiling point of 100 °C. Sunflower oil has a boiling point above 232 °C.

Suggest why sunflower oil and not water is used to make crisps from thin slices of potato.

.....

.....

.....

.....

(2 marks)

3 (d) Additives in some crisps include red chilli powder.

Sudan 1 is a bright red dye and is thought to cause cancer. In 2005, it was used to add more colour to a large batch of chilli powder. This batch of chilli powder was used by many food companies. The contaminated foods were removed from sale and destroyed.

3 (d) (i) Suggest why more colour was added to this batch of chilli powder.

.....

.....

(1 mark)

3 (d) (ii) Why is it **not** a good idea to add Sudan 1 to chilli powder?

.....

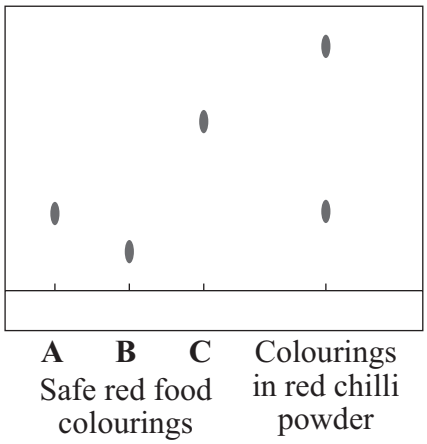
.....

(1 mark)

Areas outside the box will not be scanned for marking

3 (e) A crisp manufacturer tested its chilli powder to check that it contained only safe food colourings.

The results of the test are shown below.



3 (e) (i) Draw a ring around the correct word in the box to complete the sentence.

This method of detecting and identifying colours is called

chromatography.
distillation.
electrolysis.

(1 mark)

3 (e) (ii) What do the results of this test tell you about the colours in the red chilli powder?

.....

.....

.....

.....

(2 marks)

10

Turn over ▶

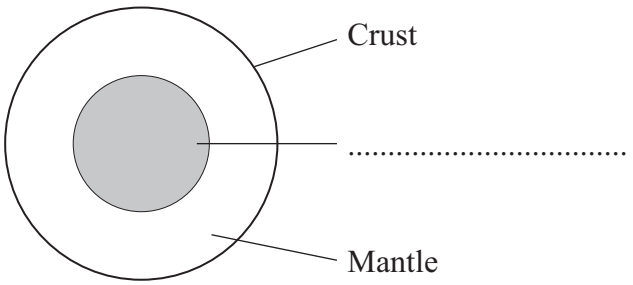
Areas outside the box will not be scanned for marking

4 Earthquakes are common in certain places on Earth.

4 (a) The diagram shows the layered structure of the Earth.

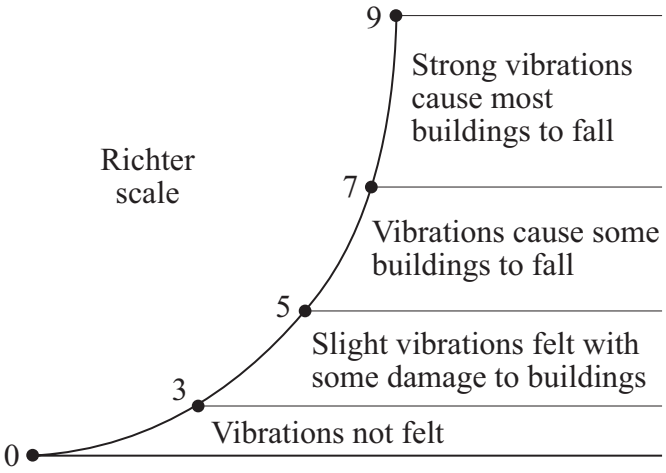
Choose one word from the box to complete the label on the diagram.

atmosphere	**core**	**plate**



(1 mark)

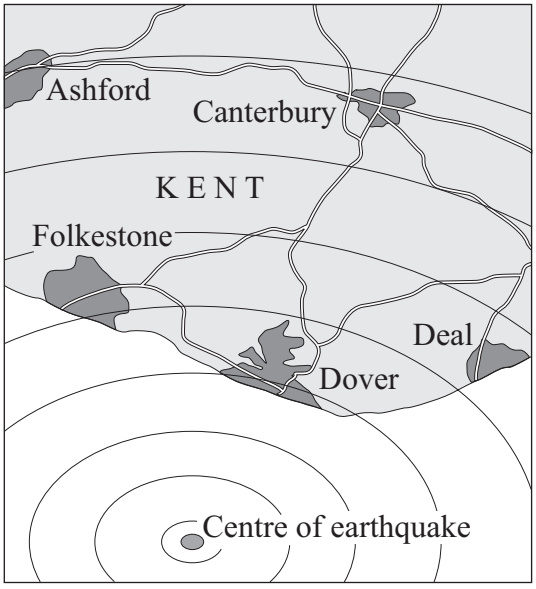
4 (b) In 1935 C.F. Richter designed a scale for comparing the size of earthquakes.



STEMUP.CO.UK

Areas outside the box will not be scanned for marking

4 (b) A newspaper reported that an earthquake off the coast of Kent had caused plaster to come down from ceilings, house tiles to loosen and church bells to ring.



4 (b) (i) Earthquakes happen often in the UK.

Suggest why most of these earthquakes are **not** reported in the newspapers.

.....

.....

(1 mark)

4 (b) (ii) Draw a ring around the number which best shows the size of the earthquake in Kent.

1 **4** **6** **8**

(1 mark)

4 (b) (iii) State what causes earthquakes.

.....

.....

(1 mark)

4 (b) (iv) Why were people living in Kent **not** warned about this earthquake?

.....

.....

(1 mark)

5

Turn over ▶

Areas outside the box will not be scanned for marking

5 Water sold in plastic bottles has a high 'carbon cost'.

The 'carbon cost' depends on the amount of carbon dioxide emitted in making and transporting the product.

The more carbon dioxide emitted, the higher the 'carbon cost'.

5 (a) Plastic water bottles are made from a polymer.
The polymer is made from ethene.
Ethene is made by cracking hydrocarbons.

5 (a) (i) Name the polymer made from ethene.

.....

(1 mark)

5 (a) (ii) Ethene can be made by cracking the hydrocarbon pentane, C_5H_{12}.

$$C_5H_{12} \rightarrow C_2H_4 + C_3H_8$$

Explain why there is a 'carbon cost' for the process of cracking a hydrocarbon.

.....

.....

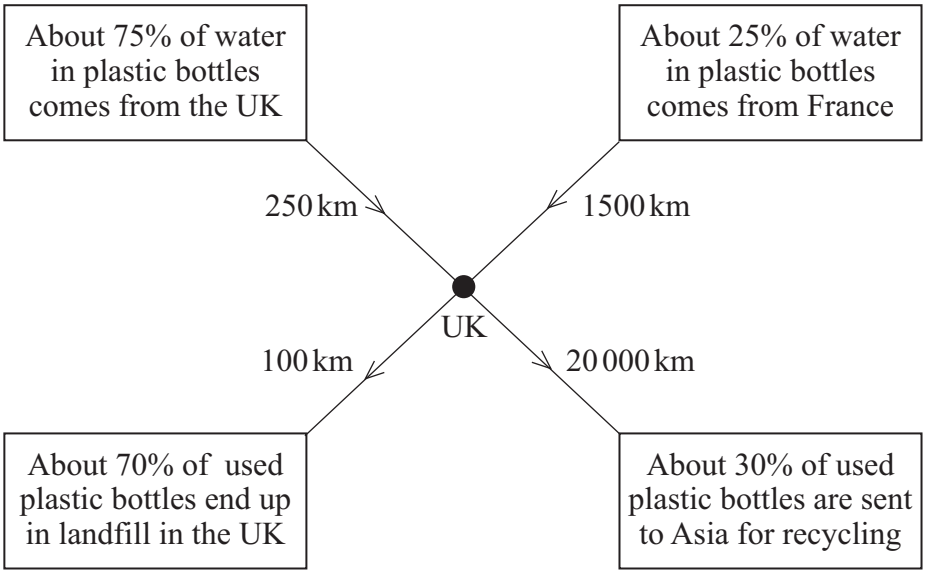
.....

.....

(2 marks)

Areas outside the box will not be scanned for marking

5 (b) The diagram shows information about water sold in plastic bottles in the UK. The diagram also shows the average distances that water and plastic bottles are transported.



Suggest how the high 'carbon cost' of water sold in plastic bottles could be reduced.

.....

.....

.....

.....

.....

.....

(3 marks)

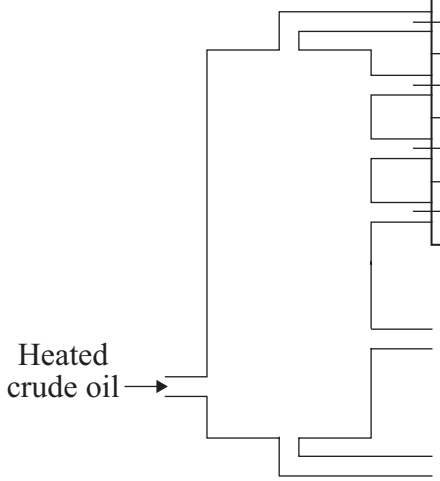
6

Turn over for the next question

Areas outside the box will not be scanned for marking

6 Crude oil is a resource from which fuels can be separated.

6 (a) The name of the main fuel fractions and one of the hydrocarbons in each fraction are shown in the table.



Main fuel fraction	A hydrocarbon in this fraction	Boiling point of hydrocarbon in °C
Gases	Propane, C_3H_8	−42
Petrol	Octane, C_8H_{18}	126
Paraffin	Dodecane, $C_{12}H_{26}$	216
Diesel	Eicosane, $C_{20}H_{42}$	344

6 (a) (i) How does the number of carbon atoms in a hydrocarbon affect its boiling point?

.....

.....

(1 mark)

6 (a) (ii) Suggest the lowest temperature to which crude oil needs to be heated to vaporise all the hydrocarbons in the table.

Temperature = ... °C

(1 mark)

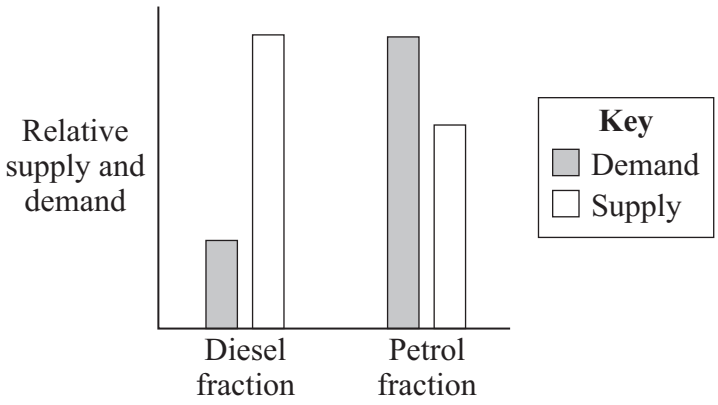
6 (a) (iii) Dodecane boils at 216 °C. At what temperature will dodecane gas condense to liquid?

Temperature = ... °C

(1 mark)

Areas outside the box will not be scanned for marking

6 (b) The bar chart shows the relative supply and demand for the petrol and diesel fractions.



6 (b) (i) How does the relative supply and demand for petrol and diesel fractions cause problems for an oil company?

.....

.....

.....

.....

(2 marks)

6 (b) (ii) Suggest **one** way an oil company could solve these problems.

.....

.....

(1 mark)

6

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Copyright © 2009 AQA and its licensors. All rights reserved.

Version 1.0: 0109

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science B 4462 / Chemistry 4421

CHY1F Unit Chemistry 1

Mark Scheme

2009 examination – January series

STEMUP.CO.UK

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2009. AQA and its licensors. All rights reserved.

COPYRIGHT
AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example:
where consequential marking needs to be considered in a calculation;
or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

COMPONENT NUMBER: CHY1F

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
1(a)	atoms		1
1(b)	mixture metal structure smart		1 1 1 1
1(c)(i)	any **two** from: • saves raw materials / iron ore • saves energy / fuels • make new / useful items • make money / it is economic • <u>reduces</u> pollution • decreases cost of steel cans • reduces carbon dioxide emissions • decreases waste materials / use of landfill	accept cheaper / saves money allow less harmful for the environment	2
1(c)(ii)	any **one** from: • provide information / education of the need to recycle • legislate against / charge for waste • reward / pay people to recycle • put labels on the cans • provide recycling bags / bins / areas	accept fine people for not recycling	1
Total			**8**

COMPONENT NUMBER: CHY1F

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
2(a)(i)	1 3		1 1
2(a)(ii)	nucleus electron		1 1
2(b)(i)	methane / CH_4	accept natural gas ignore air do **not** allow other gases	1
2(b)(ii)	carbon dioxide		1
2(c)(i)	any **two** from: • medical risks • asthma • cancer • dirt • causes global warming / global dimming / greenhouse effect / acid rain	ignore death accept effect on health accept difficulty breathing/ lung disease allow smoke particles allow harmful for the environment	2
2(c)(ii)	any **two** from: • have a test done / scientific evidence • independent (evidence) • comparison of smoke particles / when different fuels used • medical evidence **or** more / less asthma attacks **or** cancer **or** dirt on cars		2
Total			**10**

COMPONENT NUMBER: CHY1F

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
3(a)(i)	pressing		1
3(a)(ii)	dissolve		1
3(b)	bromine		1
3(c)	temperature needs to be high / above 100°C **or** (sunflower oil has a) high(er) boiling point **or** boiling point of water is not high enough any **one** from: • remove water / make potato crisp(er) • adds / gives flavour	allow melting point accept water makes potato soft / soggy	1 1
3(d)(i)	any **one** from • to look attractive / redder / brighter • to attract buyers / make more profit / sell more		1
3(d)(ii)	any **one** from: • could cause cancer • unsafe / health risk	ignore death	1
3(e)(i)	chromatography		1

Question 3 continued on next page…

STEMUP.CO.UK

COMPONENT NUMBER: CHY1F

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

Question 3 continued…

question	answers	extra information	mark
3(e)(ii)	any **two** from: • not safe / may contain Sudan 1 • <u>one</u> (colour / dye) is safe • <u>one</u> (colour / dye) is / could be unsafe • <u>two</u> (colours / dyes) **or** B and C do not match • it contains two colours / dyes	accept <u>one</u> (colour / dye) **or** A does match	2
Total			**10**

COMPONENT NUMBER: CHY1F

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
4(a)	core		1
4(b)(i)	3 or below / low on the Richter scale	accept vibrations not felt / causes no damage ignore references to injuries	1
4(b)(ii)	4		1
4(b)(iii)	movement of (Earth's / tectonic) plates	allow plates collide	1
4(b)(iv)	(earthquakes) cannot be predicted / sudden / without warning / random	ignore under / in the sea	1
Total			**5**

COMPONENT NUMBER: CHY1F

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
5(a)(i)	polyethene / poly(ethene)	accept polythene / polyethylene	1
5(a)(ii)	needs heat / energy / high temperature / fuel (for cracking) produces carbon dioxide / CO_2	ignore other processes ignore use of CO_2 **or** 'produces carbon'	1 1
5(b)	any **three** from: • use water from local sources **or** water from close to home • recycle bottles in the UK / close to home • (reduction in distance travelled) would reduce CO_2 emitted by transport • use tap water • use glass bottles / waxed cartons / metal bottles • do not put in landfill **or** recycle <u>more</u> • reuse / refill plastic bottles • <u>tax</u> imported water / plastic bottles (to offset carbon cost) • make more / all plastic bottles in UK	answers must be about the reduction of carbon cost accept do not recycle in other countries / Asia accept use of transport with low / no carbon dioxide emissions do **not** accept 'do not use plastic bottles' without an alternative material	3
Total			**6**

COMPONENT NUMBER: CHY1F

COMPONENT NAME: Science B / Chemistry

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
6(a)(i)	the greater the number (of carbon atoms), the higher its boiling point	do **not** accept hydrocarbons for carbon atoms allow converse allow melting point	1
6(a)(ii)	accept answers in the range 344 to 350		1
6(a)(iii)	216		1
6(b)(i)	**EITHER** shortage of petrol **or** demand for petrol is higher than supply diesel is in excess **or** supply of diesel is higher than demand **OR** petrol low supply **and** diesel high supply (1) petrol high demand **and** diesel low demand (1)	petrol / diesel not specified = max **1** mark	1 1
6(b)(ii)	any **one** from: • <u>use diesel</u> to make petrol • make diesel cheap(er) (than petrol) **or** make petrol more expensive • mix ethanol with petrol	accept crack diesel **or** description of cracking accept lobby the government to reduce the tax on diesel / increase tax on petrol ignore biodiesel	1
Total			**6**