

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

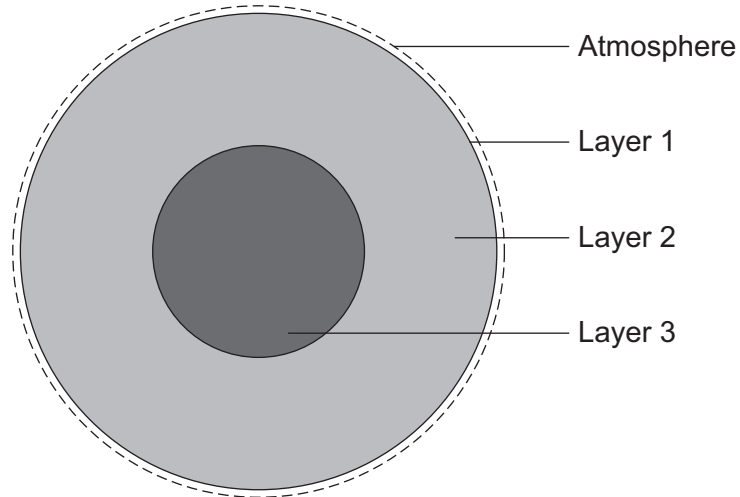
- In all calculations, show clearly how you work out your answer.



J U N 1 1 C H Y 1 F 0 1

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)



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)

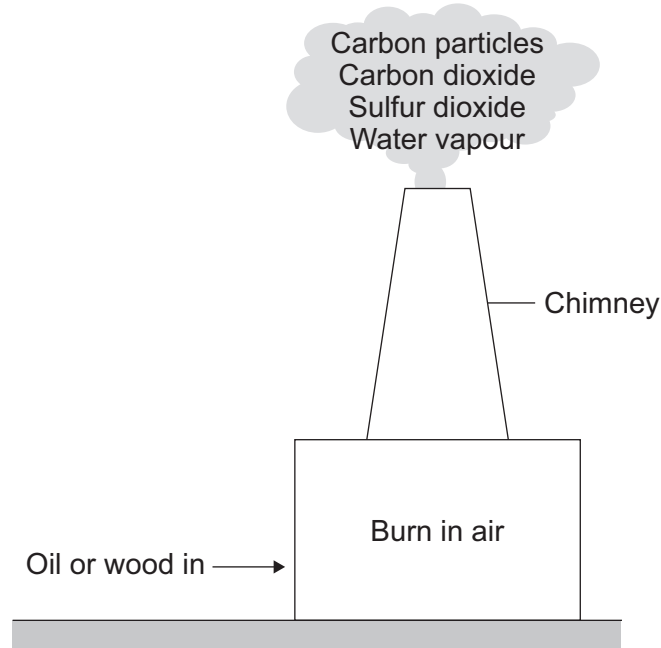
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Turn over for the next question

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- 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)



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

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3 This is part of an article about food additives.

THE PERIL OF FOOD ADDITIVES

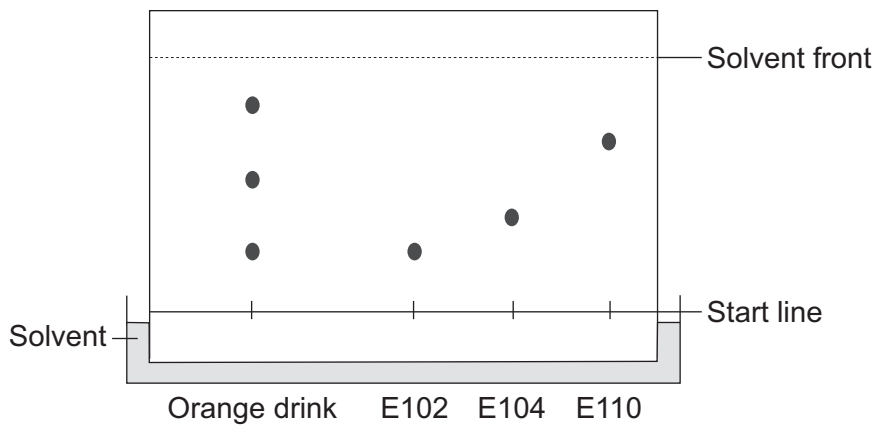
Some orange drinks contain the additives E102 (Tartrazine), E104 (Quinoline Yellow) and E110 (Sunset Yellow). These three additives are thought to cause hyperactivity in children.

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.



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

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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 \longrightarrow zinc oxide +

carbon dioxide
hydrogen
oxygen

(1 mark)

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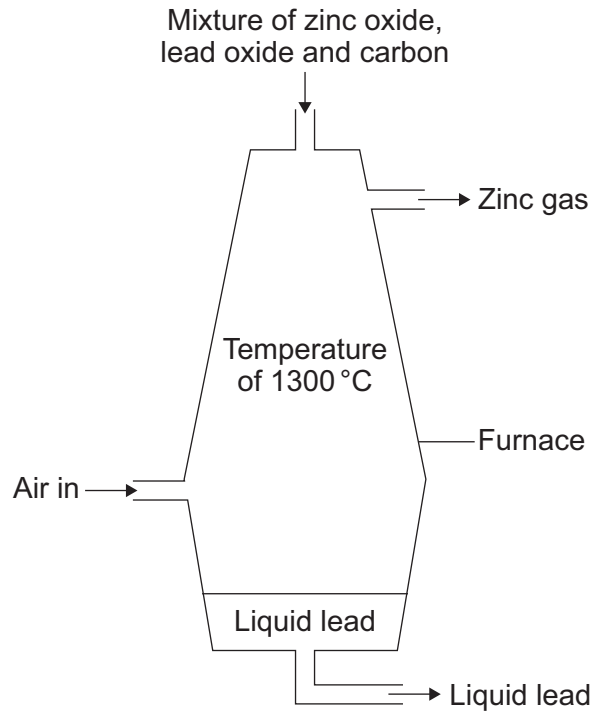


4 (c) Another ore contains a mixture of zinc carbonate and lead carbonate.

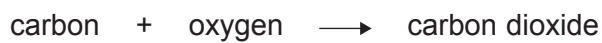
The metals zinc and lead are produced from this ore in two stages:

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:



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)

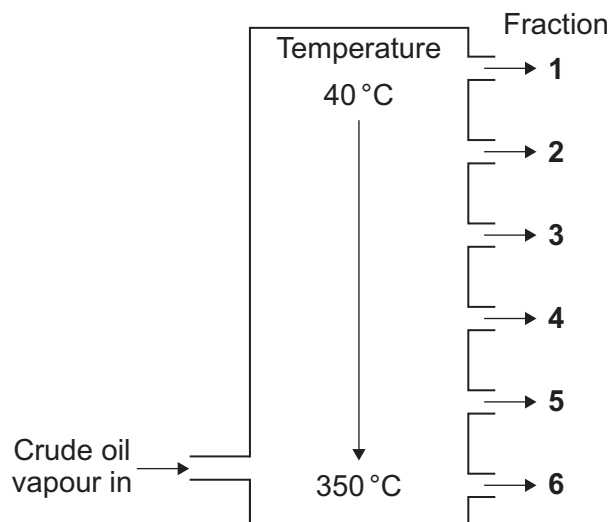
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- 5** Crude oil is a mixture of hydrocarbons.
Crude oil can be separated into fractions.



- 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)



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.



(1 mark)

5

Turn over for the next question

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

The table shows some information about four fats.

Fat	Fat content as a percentage (%)		Melting point in °C
	Unsaturated	Saturated	
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)



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

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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



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.

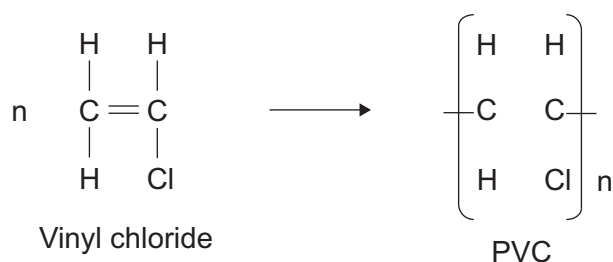
Complete the chemical equation by writing in the formula of the product vinyl chloride.



(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

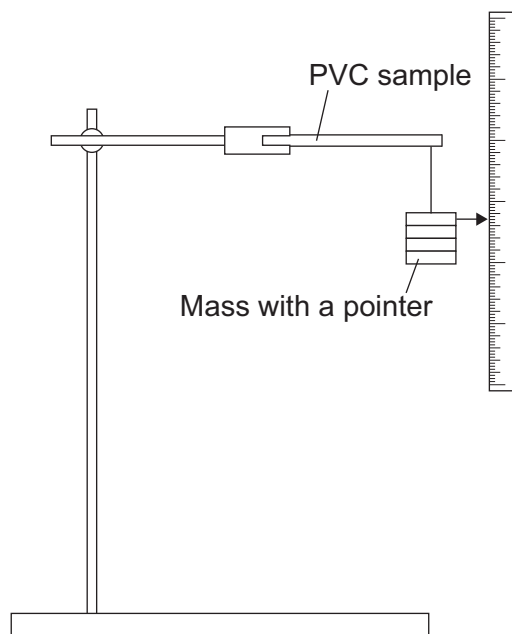
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- 7 (b)** Unplasticised polyvinyl chloride (uPVC) is used to make door and window frames. PVC with a plasticiser added is used to make cling film for wrapping food. A plasticiser is a chemical compound.

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)



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



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