

Thursday 24 May 2012 – Morning**GCSE GATEWAY SCIENCE
CHEMISTRY B****B641/01** Unit 1 Modules C1 C2 C3 (Foundation Tier)

Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)

Duration: 1 hour

Candidate forename						Candidate surname					
Centre number						Candidate number					

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

2

Answer **all** the questions.**Section A – Module C1**

1 This question is about crude oil.

(a) The picture shows an oil rig used to drill for crude oil.

In 2010 an oil rig collapsed into the sea.

Crude oil flowed into the sea for many weeks.



Write about **two** of the environmental problems caused by oil flowing into the sea.

1

.....

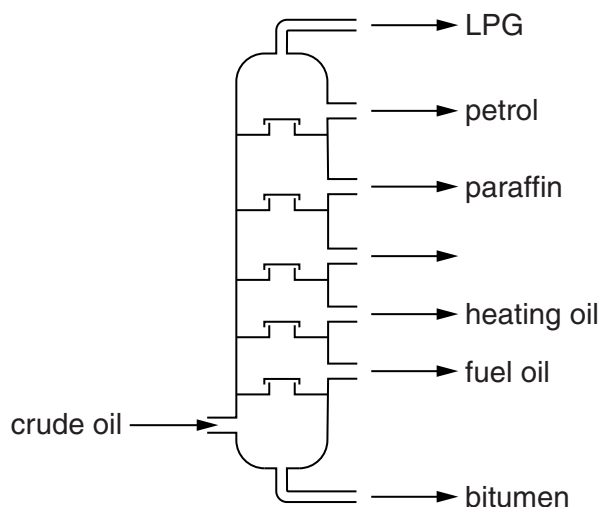
2

..... [2]

3

- (b) Crude oil is separated into useful substances, called fractions, by fractional distillation.

Look at the diagram. It shows a fractionating column.



- (i) Some of the fractions separated from the crude oil are shown on the diagram.

The name of one fraction is missing from the diagram.

Write down the name of this fraction.

Choose from this list.

butane

diesel

ethene

hydrogen

propane

answer [1]

- (ii) **LPG** comes out of the top of the column.

Explain why.

Use ideas about boiling points.

.....

..... [1]

[Total: 4]

2 This question is about polymers.

(a) Polyester, polystyrene and polythene are three commonly used polymers.

The table lists some of the properties of these polymers.

polymer	property 1	property 2
polyester	can be dyed	flexible
polystyrene	insulates	not flexible
polythene	waterproof	flexible

(i) What is the **most** suitable use for polystyrene?

Choose from this list.

plastic bags

a raincoat

a cup for hot drinks

making clothes

answer [1]

(ii) These polymers are **non-biodegradable**.

What is meant by non-biodegradable?

..... [1]

(iii) One way of disposing of waste polymers is to burn them.

Explain the environmental problems caused by burning waste polymers.

.....
 [1]

(b) Look at the table.

The table lists some monomers and polymers.

Complete the table.

monomer	polymer
ethene	poly(ethene)
chloroethene	
.....	poly(propene)

[2]

(c) Ethene is made into poly(ethene) in a reaction called polymerisation.

Put a tick (✓) in the box next to the correct description of polymerisation.

A reaction that changes large hydrocarbon molecules into smaller ones.

☐

A reaction that changes one fraction into another.

☐

A reaction in which polymers are changed into monomers.

☐

A reaction in which small molecules are joined together.

☐

[1]

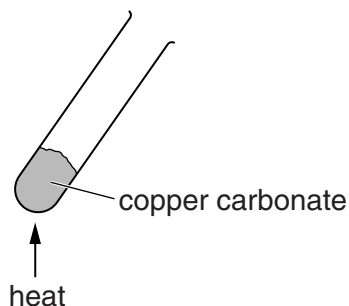
[Total: 6]

6

3 This question is about chemical changes.

(a) Molly and Jess find the mass of a test tube containing some copper carbonate.

They heat this test tube.



When the test tube has cooled they find the mass again.

Look at the table. It shows their observations.

observation	before heating	after heating
colour	green	black
mass in g	10.80	10.20

Molly and Jess look at their results and say

‘Heating copper carbonate causes a chemical change.’

Write down **two** reasons why they say this.

Use **only** information from the table.

.....

.....

..... [2]

(b) Molly and Jess now investigate adding some substances to 10 cm³ of water in a test tube.

They measure the temperature of the water before and after adding the substance.

They record their observations in a table.

substance	temperature of water at start in °C	temperature of water after substance added in °C
sodium chloride	20.0	20.0
copper sulfate	20.0	60.4
ammonium nitrate	20.0	10.5

(i) What is the temperature change for ammonium nitrate?

answer..... °C

[1]

(ii) Energy was **given out** when one substance reacted with the water.

Write down the name of this substance.

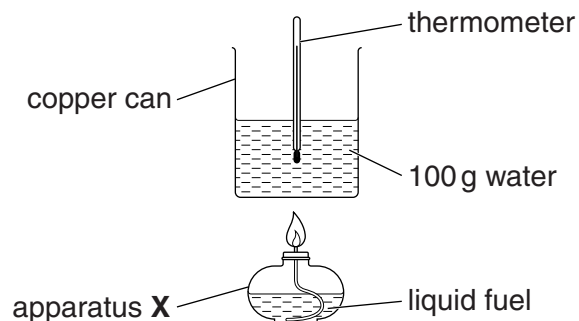
..... [1]

8

(c) Molly and Jess investigate three fuels.

They want to find out which fuel gives off the most energy.

Look at the diagram. It shows the equipment they use.



(i) Write down the name of apparatus X.

..... [1]

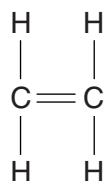
(ii) They burn 2.0 g of fuel and use 100 g of water each time.

Write down **one other** way Molly and Jess could make sure that each experiment is a **fair test**.

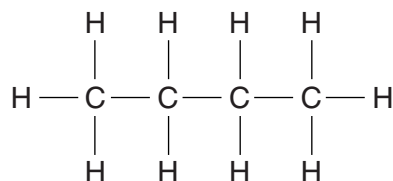
.....
..... [1]

[Total: 6]

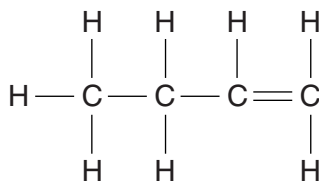
4 Look at the displayed formulas of some hydrocarbons.



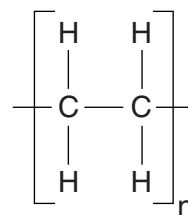
compound **A**



compound **B**



compound **C**



compound **D**

(a) Compounds **A**, **B**, **C** and **D** are **hydrocarbons**.

Explain why.

.....
 [1]

(b) Compounds **A** and **C** are **alkenes**.

Explain why.

.....
 [1]

(c) Look at the displayed formula for compound **C**.

What is the total number of **atoms** in one molecule of compound **C**?

..... [1]

(d) Look at the displayed formula for compound **B**.

Write down the **molecular formula** of compound **B**.

answer [1]

[Total: 4]

10

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

Section B – Module C2

- 5 This question is about building materials.

Look at this list of building materials.

aluminium

concrete

copper

glass

granite

limestone

marble

steel

Choose **only** building materials from the list to answer the questions.

Each building material can be used **once, more than once** or **not at all**.

- (a) Which building material is used to reinforce concrete?

..... [1]

- (b) Two of the building materials are forms of calcium carbonate.

Write down the name of **one** of these building materials.

..... [1]

- (c) Which building material is made from sand?

..... [1]

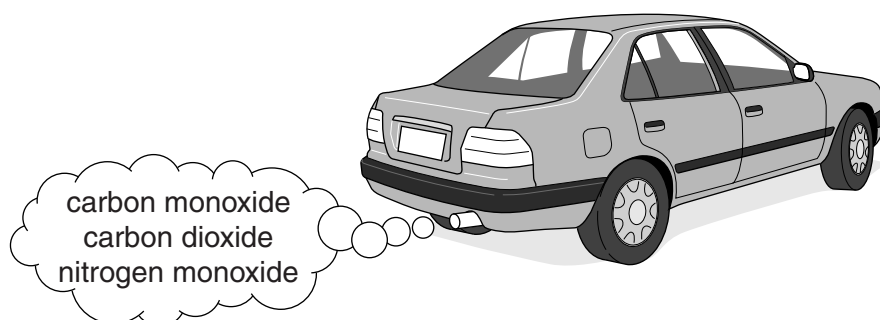
- (d) Which building material is the **hardest rock**?

..... [1]

[Total: 4]

6 Car engines make pollutants.

The picture shows some of the pollutants found in the exhaust gas of a car.



- (a) Carbon monoxide in the air is dangerous.

Explain why.

..... [1]

- (b) Nitrogen monoxide is an oxide of nitrogen.

Nitrogen monoxide in the air causes some environmental problems.

Write down **one** of these problems.

..... [1]

- (c) Nitrogen, N_2 , reacts with oxygen, O_2 , inside a hot car engine.

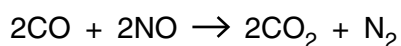
Nitrogen monoxide, NO, is made.

Write down the **balanced symbol** equation for this reaction.

..... [2]

- (d) A catalytic converter lowers the levels of carbon monoxide and nitrogen monoxide in the exhaust gas.

Carbon monoxide reacts with nitrogen monoxide.



- (i) One of the reactants or products of this reaction is an **element**.

What is the **name** of this element?

..... [1]

13

- (ii) The reaction between carbon monoxide and nitrogen monoxide is very slow at 25°C.

Suggest why.

Use ideas about particles.

.....

.....

..... [2]

[Total: 7]

7 People put their domestic waste into dustbins.

Look at the table.

The table shows how the typical contents of a dustbin have changed over fifty years.

type of waste	percentage by mass in 1960	percentage by mass in 2010
glass	15	9
metals	11	8
organic waste including waste food	22	22
paper	38	38
plastics	5	9
textiles	2	2
other	7	12

- (a) The percentage of some types of waste has changed since 1960.

Describe how the percentages of **two** types of waste have changed from 1960 to 2010.

.....

.....

..... [2]

- (b) Aluminium, copper and iron are three metals found in waste.

Iron is often present as an **alloy** called steel.

- (i) Write down **one** use for steel, other than as a building material.

..... [1]

- (ii) What is meant by the word alloy?

.....

..... [1]

- (iii) Write down the name of one **other** alloy.

..... [1]

15

- (c) It is important to recycle the metals found in waste.

Write down **two** reasons why.

- 1
-
- 2
- [2]

- (d) Look at the table of information about aluminium and iron.

property	aluminium	iron
magnetism	not magnetic	magnetic
corrosion		
density in g/cm ³	2.7	7.9
relative electrical conductivity	4.0	1.1
relative strength	7.0	21.0

- (i) Complete the table. [1]

- (ii) Aluminium and iron must be separated before they can be recycled.

Suggest how a mixture of aluminium and iron can be separated.

Use information from the table.

-
- [1]

[Total: 9]

Section C – Module C3

- 8 Kate heats some magnesium in air.

Magnesium reacts with oxygen.

Magnesium oxide is made.

- (a) Write down the **word equation** for this reaction.

..... [1]

- (b) Read the following statements.

Put ticks (✓) in the boxes next to the **two** correct properties of magnesium oxide.

Magnesium oxide is a gas at room temperature.

☐

Magnesium oxide has a high melting point.

☐

Magnesium oxide is a liquid at room temperature.

☐

Solid magnesium oxide does not conduct electricity.

☐

Melted magnesium oxide does not conduct electricity.

☐

[2]

- (c) When a magnesium atom reacts with oxygen a magnesium ion is made.

Look at the table.

It shows the particles in a magnesium atom and a magnesium ion.

particle	magnesium atom	magnesium ion
number of electrons	12	10
number of protons	12	12
number of neutrons	12	12

- (i) What is the difference between a magnesium atom and a magnesium ion?

Use information from the table.

.....
 [1]

- (ii) How many particles are there in the **nucleus** of a magnesium ion?

..... [1]

[Total: 5]

- 9 This question is about chlorine, Cl , and bromine, Br .

The Periodic Table on the back page may help you.

- (a) What is the **atomic number** of chlorine?

..... [1]

- (b) In which **group** of the Periodic Table is chlorine?

..... [1]

- (c) How many electrons are there in the outer shell of a bromine atom?

..... [1]

- (d) How many occupied electron shells are there in a bromine atom?

..... [1]

- (e) Bromine is an orange liquid at room temperature.

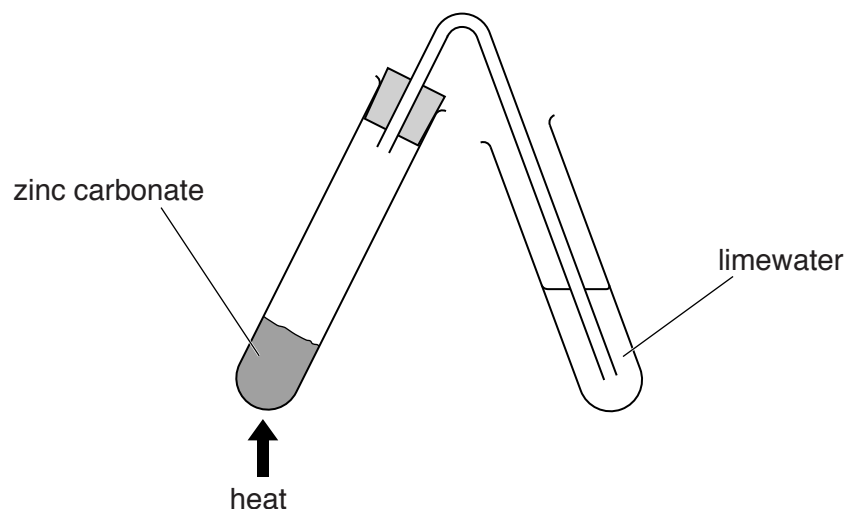
What does **chlorine** look like at room temperature?

..... [1]

[Total: 5]

10 Ali heats zinc carbonate.

Look at the diagram. It shows the apparatus he uses.



Ali records the mass of the zinc carbonate before he starts heating.

He also records the mass after he has finished heating.

Ali then repeats the experiment with three more substances.

substance	mass before heating in g	mass after heating in g	effect on limewater
zinc carbonate	2.00	1.30	goes milky
sodium carbonate	2.00	2.00	stays colourless
copper carbonate	2.00	1.29	goes milky
iron(II) sulfate	2.00	1.16	stays colourless

(a) Which substance had the **greatest** change in mass?

..... [1]

(b) Carbon dioxide is made when zinc carbonate is heated.

How can you tell from the results?

.....

..... [1]

19

(c) Iron(II) sulfate has the formula FeSO_4 .

A solution of iron(II) sulfate contains Fe^{2+} ions.

(i) How many different **elements** are shown in the formula FeSO_4 ?

..... [1]

(ii) Ali adds some sodium hydroxide solution to iron(II) sulfate solution.

Write down what Ali will see.

..... [1]

(d) Ali decides to do a flame test with the four substances.

What is the flame colour for sodium carbonate?

Choose from this list.

green

lilac

pink

red

yellow

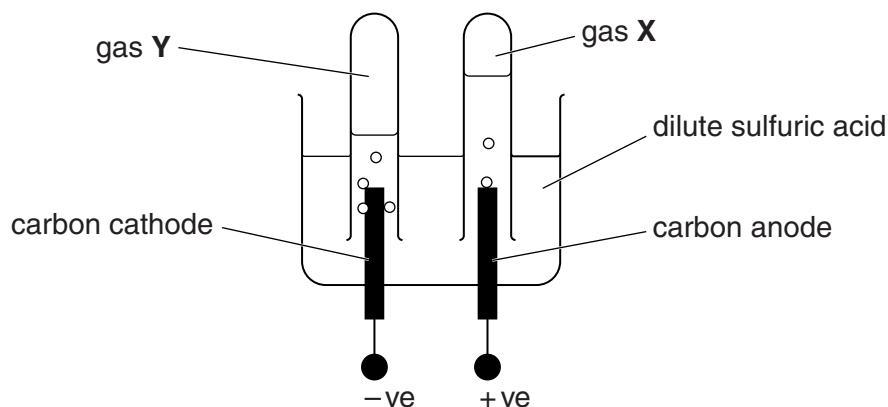
answer

[1]

[Total: 5]

11 Phil investigates the electrolysis of dilute sulfuric acid.

Look at the apparatus he uses.



(a) Phil wants to check that gas **X** is oxygen and gas **Y** is hydrogen.

Write about how Phil can test for hydrogen and test for oxygen.

Include the

- test
- result of the test

for both gases.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

21

(b) Look at this list. It shows the particles in dilute sulfuric acid.



Which particle is a molecule?

answer

[1]

[Total: 5]

END OF QUESTION PAPER

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

PLEASE DO NOT WRITE ON THIS PAGE



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© OCR 2012

*The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.