

GCSE

CHEMISTRY B

Chemistry B Unit 1 Modules C1, C2, C3

Specimen Paper

Candidates answer on the question paper:

Additional materials: ruler (cm/mm), calculator

H **B641/02**

60 mins

Candidate
Name

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Centre
Number

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Candidate
Number

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TIME 60 mins

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers on the dotted lines unless the question says otherwise.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for a correct method even if the answer is incorrect.
- Do not write in the bar code. Do not write in the grey area between the pages.
- **DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.**

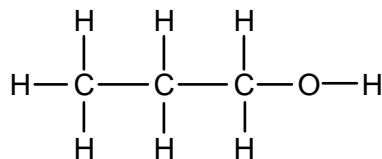
INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.

This specimen paper consists of 30 printed pages.

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(b) Look at the diagram. It shows the displayed formula of propanol.



(i) Write down the molecular formula for propanol.

.....[1]

(ii) Propanol is **not** a hydrocarbon.

Explain why.

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

(c) Many fuels, such as petrol and diesel, are obtained from crude oil.

There are environmental and political issues concerned with the extraction and use of crude oil.

Briefly discuss some of these issues.

.....
.....
.....
.....
.....[2]

[Total: 7]

2. This question is about cooking chemistry.

(a) We do not eat uncooked potatoes.

This is because cooking improves the texture, taste and flavour.

Write down **one** other reason.

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

(b) Cooking a potato is an example of a chemical change.

Write down **two** reasons why.

1

2[2]

(c) Sodium hydrogencarbonate, NaHCO_3 , is used in baking.

When heated it decomposes to sodium carbonate, Na_2CO_3 , water and carbon dioxide.

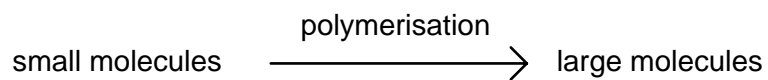
Write a balanced symbol equation for this reaction.

.....[2]

[Total: 5]

3. This question is about polymerisation.

Polymerisation changes many small molecules into large molecules.

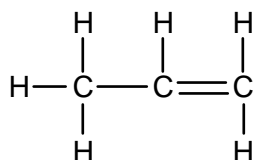


(a) What conditions are needed for polymerisation?

.....
.....[2]

(b) Look at the diagram.

It shows the displayed formula of a monomer named propene.



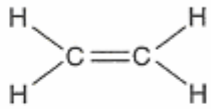
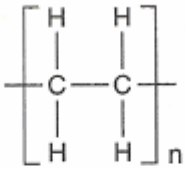
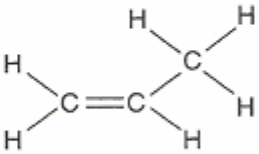
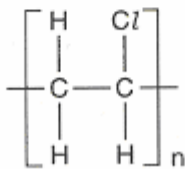
Propene is an alkene. It is **unsaturated**.

Why is propene unsaturated?

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

(c) Look at this table. It shows the displayed formula of some monomers and polymers.

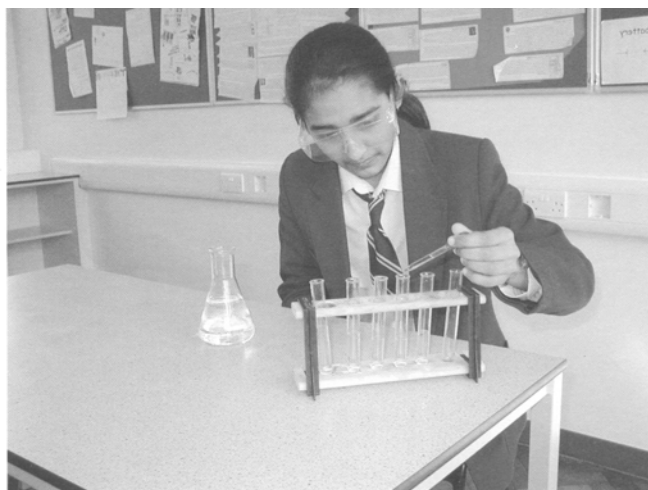
Complete the table.

name of monomer	displayed formula of monomer	displayed formula of polymer
ethene		
propene		
chloroethene		

[2]

[Total: 5]

4. Feshna makes a perfume.



The perfume she makes is an ester.

She uses an acid in her experiment.

(a) Which other chemical must she use?

Put a tick (✓) in the correct box.

an alcohol

an alkali

an emulsifier

a polymer

[1]

(b) One property that a perfume should have is that it easily evaporates.

Write about the ease of evaporation of perfumes.

In your answer you should write about

- energy of particles
- attractive forces.

.....

.....

.....

.....

.....[2]

[Total: 3]

Section 2

1. Petrol is a fuel. It is used in the engines of motor cars.

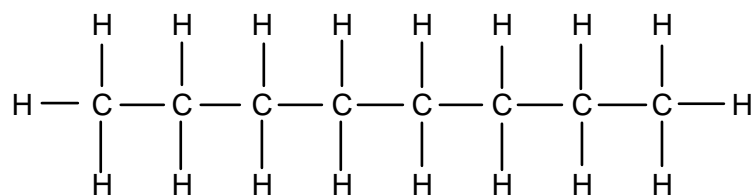


(a) Petrol is a mixture of substances.

One of the substances is heptane. It has the molecular formula C_7H_{16} .

Another substance in petrol is octane.

Look at the displayed formula of octane.



Write down the **molecular formula** for octane.

.....[1]

(b) Look at the table.

It shows what is found in the exhaust gases of a car.

The car has a petrol engine.

gas in the exhaust	percentage of gas in exhaust
carbon dioxide	8
carbon monoxide	5
hydrogen	2
oxygen	4
nitric oxide	0.3
nitrogen	71
water vapour	9

(i) Some incomplete combustion takes place in the petrol engine of a car.

What evidence is there in the table to show this?

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

(ii) Many cars have a catalytic converter fitted.

A catalytic converter removes some of the gases from the exhaust.

Write down the name of one gas removed by a catalytic converter.

.....[1]

(c) Petrol is a **fossil** fuel.

More and more fossil fuels are being burnt each year.

This may change the composition of air.

Describe and explain possible changes in the composition of air.

.....

.....

.....

.....

.....[4]

[Total: 7]

2. Cars bodies made from iron and steel will rust.

The picture shows a rusty car body.



- (a) Oxygen and water are needed for the iron parts in a car to rust.

The chemical name for rust is hydrated iron(III) oxide.

Write the word equation for the rusting of iron.

.....[1]

- (b) Nowadays some car bodies are made from aluminium.

Write down **one** advantage of using aluminium instead of iron.

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

(c) This question is about ideas and evidence in science.

Sam is a research scientist.

He has just discovered a new alloy.

This alloy is suitable for making car bodies.

Sam decides to tell other scientists around the world about his discovery.

Describe how, **and** explain why Sam should tell other scientists.

.....

.....

.....

.....

.....[2]

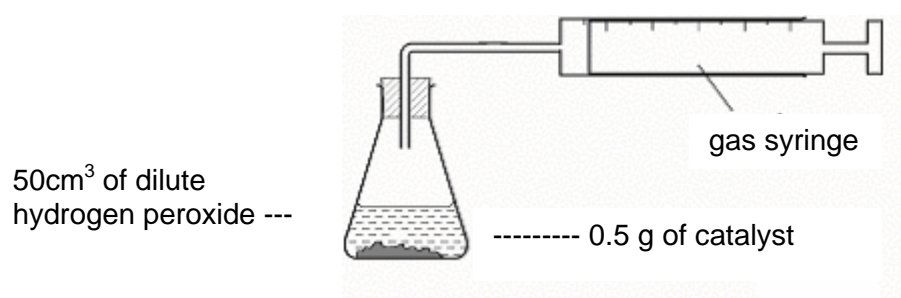
[Total: 4]

3. Dilute hydrogen peroxide is used to make oxygen in a laboratory.
Hydrogen peroxide decomposes to make water and oxygen.

(a) Write the word equation for this decomposition reaction.

.....[1]

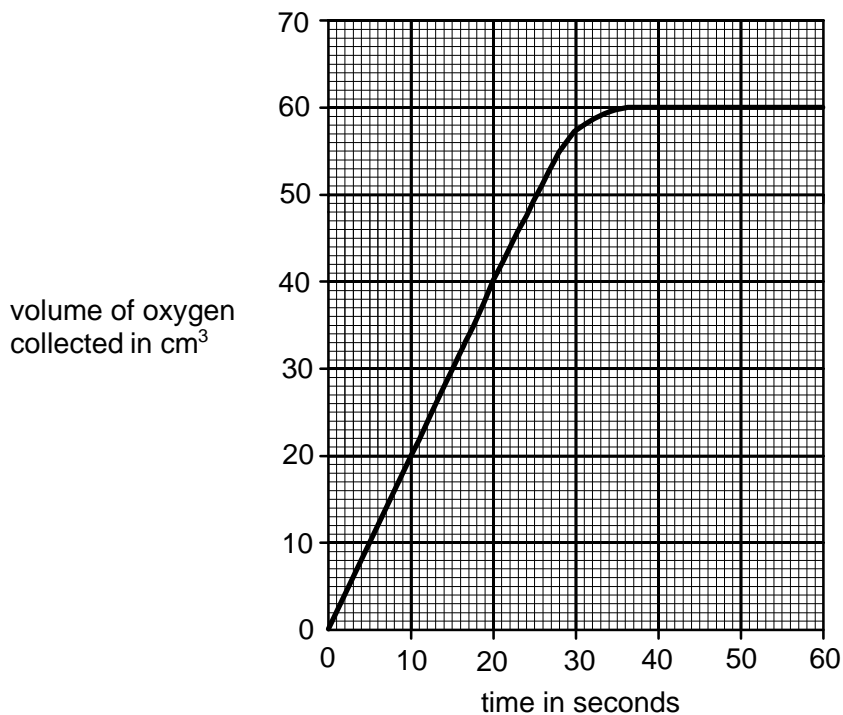
(b) Laura investigates the decomposition of dilute hydrogen peroxide at room temperature.
Look at the apparatus she uses.



Laura uses 50 cm³ of dilute hydrogen peroxide and 0.5 g of a catalyst.

Laura records the volume of oxygen collected every 10 seconds.

This is a graph of Laura's results.



Look at the graph.

The reaction stops when all the hydrogen peroxide has been used up.

How long does it take for all the hydrogen peroxide to react?

.....seconds

[1]

(c) Laura uses 0.5g of a catalyst.

How much of the catalyst remains at the end of the reaction?

Choose from

more than 0.5 g

0.5 g

less than 0.5 g

Answer[1]

(d) Laura wants to make the decomposition reaction of hydrogen peroxide faster.
She still wants to use
0.5 g of the catalyst
50 cm³ of hydrogen peroxide solution.

(i) Laura decides to use hotter hydrogen peroxide.
The decomposition reaction is faster.
Explain why.
Use ideas about collisions between particles.

.....
.....
.....
.....[2]

(ii) Laura also knows that the reaction will go faster if she uses more concentrated hydrogen peroxide.

Explain why.
Use ideas about collisions between particles.

.....
.....
.....
.....[2]

[Total: 7]

- 4. Cement, sand and water are used make concrete.
Reinforced concrete is a composite material.
A road bridge is made using reinforced concrete.



Explain why reinforcing concrete with steel makes it a better construction material.

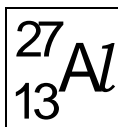
.....
.....
.....
.....[2]

[Total: 2]

Section 3

1. This question is about the structure of atoms.

An atom of aluminium can be represented by



The **atomic number** of aluminium is 13.

- (a) What does atomic number mean?

.....[1]

- (b) The table shows some information about an aluminium atom.

Complete the table.

Number of protons	
Number of neutrons	
Number of electrons	13

[2]

- (c) Aluminium has 13 electrons.

Write down the electronic structure of an aluminium atom.

.....[1]

- (d) Calcium, Ca, reacts with oxygen, O₂, to make calcium oxide, CaO.

Write a **balanced symbol equation** for this reaction.

.....[2]

[Total: 6]

2. Look at the table. It shows some properties of Group 7 elements.

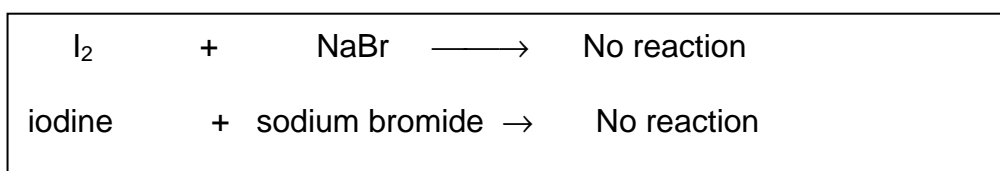
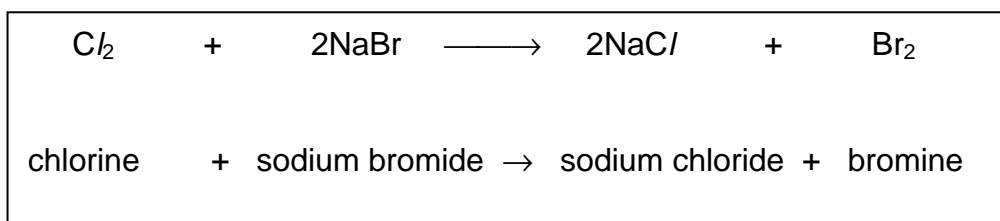
element	molecular formula	state at room temperature	colour	radius of an atom (nm)	order of reactivity
fluorine	F ₂	pale yellow	0.072	most reactive ↑ ↓ least reactive
chlorine	Cl ₂	gas	pale green	0.099	
bromine	Br ₂	liquid	red/brown	0.114	
iodine	I ₂	solid	grey	0.150	
astatine	At ₂	solid	black	

(a) Complete the table. Use ideas about trends down a group.

[2]

(b) In the table, the group 7 elements are listed in order of their reactivity.

Look at the equations. They show two displacement reactions of the halogens.



- (i) Complete this word equation.

bromine + sodium iodide \longrightarrow [1]

- (ii) There is no reaction between iodine and sodium bromide.

Explain why.

.....

..... [1]

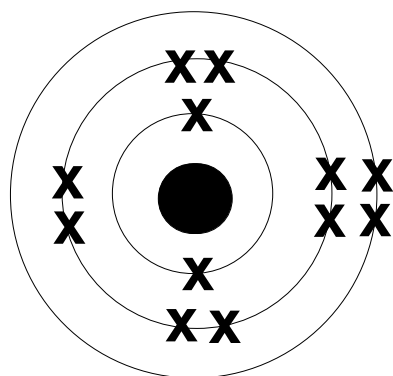
- (iii) Chlorine reacts with sodium iodide to make sodium chloride and iodine.

Write a **balanced symbol equation** for this reaction.

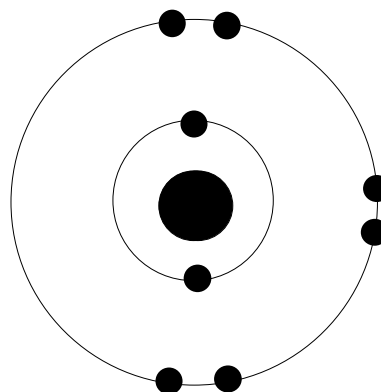
.....[2]

[Total: 6]

3. Look at the diagrams. They show the electronic structures of magnesium and oxygen.



magnesium atom



oxygen atom

When magnesium reacts with oxygen, magnesium ions and oxide ions are made.

- (a) Draw the electronic structures of a magnesium ion and an oxide ion.

magnesium ion

oxide ion

[2]

- (b) Magnesium is a metal. It conducts electricity.

What type of particle moves when magnesium conducts electricity?

..... [1]

(c) Copper is also a metal. It is used to make saucepan bases.

Suggest a property of copper that makes it suitable to make saucepan bases.

.....[1]

[Total: 4]

4. Nikita and Matthew do some flame tests.

They test the chemicals in three bottles.

One bottle contains sodium chloride, another potassium chloride and a third lithium chloride.

The names are missing from the bottles.

Nikita and Matthew are asked to find out which chemical each bottle contains.

Describe how they do a flame test.

You should include

- what they do
- the results they would get for each chemical.

You may wish to draw a diagram to help your answer.

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 4]

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GCSE

CHEMISTRY B

Chemistry B Unit 1 Modules C1, C2, C3

Specimen Mark Scheme

Maximum mark for this paper is 60

H **B641/02**

60 mins

This specimen mark scheme consists of 4 printed pages.

<p>Section 2</p> <p>1(a)</p> <p>1(b)i</p> <p>1(b)ii</p> <p>1(c)</p>	<p>C_8H_{18} ;</p> <p>Presence of carbon monoxide / presence of hydrogen;</p> <p>Carbon monoxide / nitric oxide / nitrogen dioxide / oxides of nitrogen;</p> <p>Any four from More sulphur dioxide because more fossil fuels containing sulphur or sulphur compounds are being burn;t More nitric oxide /oxides of nitrogen formed by reaction between nitrogen and oxygen at high temperature; More carbon dioxide because of combustion of fuel; Idea that burning releases carbon dioxide that is trapped within a fuel or plant; Less oxygen because it is used up in combustion; More water vapour produced during combustion;</p> <p style="text-align: right;">Total marks</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[4]</p> <p>[7]</p>
<p>2(a)</p> <p>2(b)</p> <p>2(c)</p>	<p>Iron + water + oxygen → hydrated iron(III) oxide;</p> <p>Aluminium does not rust / aluminium has a lower density / same car body will weigh less;</p> <p>Any two from Means of communication e.g. phone, conference, internet, book, journal, meeting; To get work evaluated / aw; So no other scientist could take credit; So other scientists could develop the work / aw;</p> <p style="text-align: right;">Total marks</p>	<p>[1]</p> <p>[1]</p> <p>[2]</p> <p>[4]</p>
<p>3(a)</p> <p>3(b)</p> <p>3(c)</p> <p>3(d)i</p> <p>3(d)ii</p>	<p>Hydrogen peroxide → oxygen + water;</p> <p>44-48 (seconds);</p> <p>0.5 (g);</p> <p>Particles move faster / particles have more energy / more collisions per second; more successful collisions / more energetic collisions;</p> <p>More crowded particles; More collisions per second / greater collision frequency;</p> <p style="text-align: right;">Total marks</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[2]</p> <p>[2]</p> <p>[7]</p>
<p>4</p>	<p>Any two from Steel provided extra strength; Steel provides extra flexibility; Concrete makes it hard;</p> <p style="text-align: right;">Total marks</p>	<p>[2]</p> <p>[2]</p>

