

**GCSE**

**CHEMISTRY B**

Chemistry B Unit 2: Modules C4, C5, C6

**Specimen Paper**

Candidates answer on the question paper:

Additional materials: ruler (cm/mm), calculator

**F**

**B642/01**

60 mins

Candidate  
Name

--

Centre  
Number

--	--	--	--	--

Candidate  
Number

--	--	--	--

**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**.

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**This specimen paper consists of 28 printed pages.**

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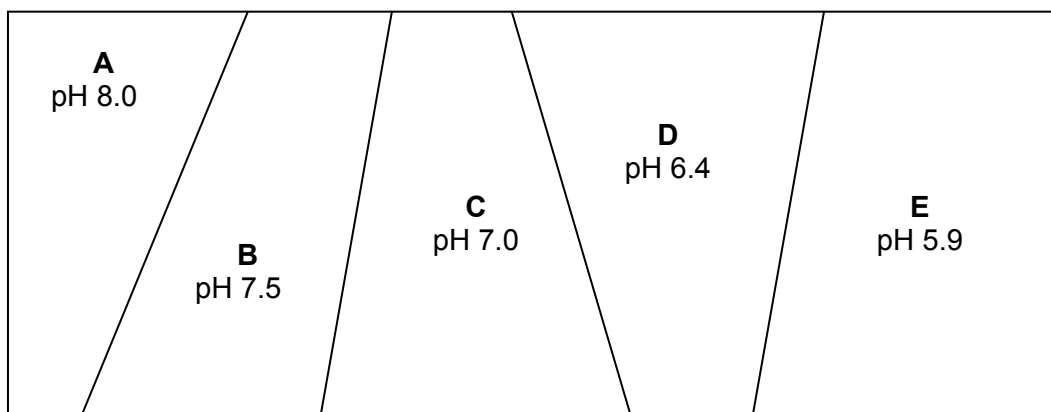
**Answer all questions**

1. Sally is testing the pH of soil in her garden.

The garden is divided into five different areas called 'plots'.

She tests the soil on each plot

Look at the diagram. It shows her results.



- (a) Which soil is the most alkaline?

Choose from **A**, **B**, **C**, **D** or **E**.

.Answer .....[1]

- (b) The table shows the names of some plants Sally wants to grow.

It also shows the soil pH the plants need to grow well.

name of plant	best pH of soil
apple	5.0 – 6.5
blackcurrant	6.0 – 8.0
mint	7.0 – 8.0
potato	4.5 – 6.0
strawberry	5.0 – 7.0

Use the information to answer these questions.

- (i) Sally wants to grow potatoes.

Which would be the best plot to plant them in?

Choose from **A, B, C, D** or **E**.

Answer .....[1]

- (ii) Sally wants to increase the pH of plot **D**.

Which type of substance should she add to the soil.

Choose from the list

**an acid**

**an alcohol**

**an alkali**

**a salt**

Answer .....[1]

- (c) Sally puts calcium oxide onto the soil in plot **D**.

Calcium oxide reacts with the nitric acid in the soil.

Look at the word equation for this reaction.

calcium oxide + nitric acid  $\rightarrow$  calcium nitrate + water

Write down the names of the **products** in this reaction.

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

(d) Sally adds a chemical to plot **B**.

The pH of plot B changes from 7.5 to 7.0.

What type of reaction has taken place?

Put a tick (✓) in the correct box

**electrolysis**

**neutralisation**

**oxidation**

**reduction**

[1]

[Total: 5]

2 Asif is adding fertiliser to the soil.

(a) Fertilisers contain the essential elements N, P and K.

N is nitrogen.

Write down the **names** of the other two essential elements in fertiliser.

P is .....

K is .....[2]

(b) Asif uses a fertiliser that contains potassium phosphate,  $K_3PO_4$ .

Look at the table.

It shows the number of atoms of each element present in the formula of potassium phosphate,  $K_3PO_4$ .

Complete the table.

element	number of atoms present in potassium phosphate
potassium	
phosphorus	
oxygen	

[3]

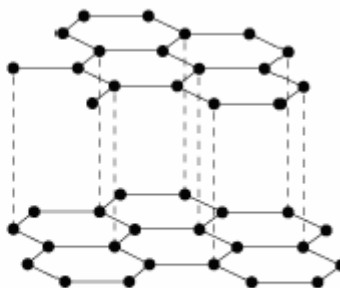
[Total: 5]

3. This question is about diamond and graphite.

Look at the diagrams. They show the structure of diamond and graphite.



diamond



graphite

- (a) Diamond and graphite are forms of the same element.

Write down the name of this element.

.....[1]

- (b) Diamond and graphite have several important uses.

Draw a straight line from each use to the reason why diamond or graphite is suitable for this use.

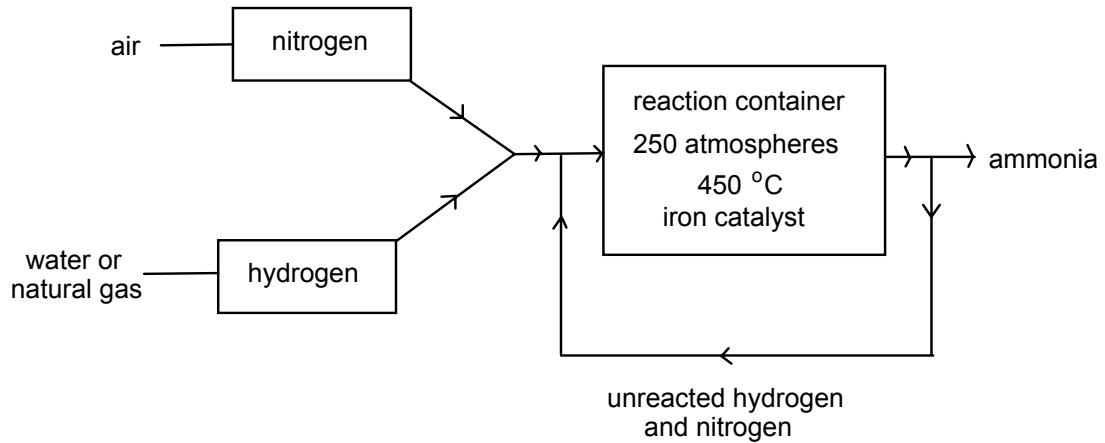
use	reason
Graphite is used in pencil leads	because it conducts electricity
Diamond is used in cutting tools	because it sparkles and is transparent
Graphite is used as an electrode in electrolysis	because it has a high melting point and is very hard
Diamond is used in jewellery	because it is slippery

[3]

[Total: 4]

4. Ammonia is made from nitrogen and hydrogen.

Look at the flow chart. It shows how ammonia is made using the Haber process.



- (a) One of the costs of making ammonia is the cost of the catalyst.

Write about the other costs of making ammonia.

.....

.....

.....

.....

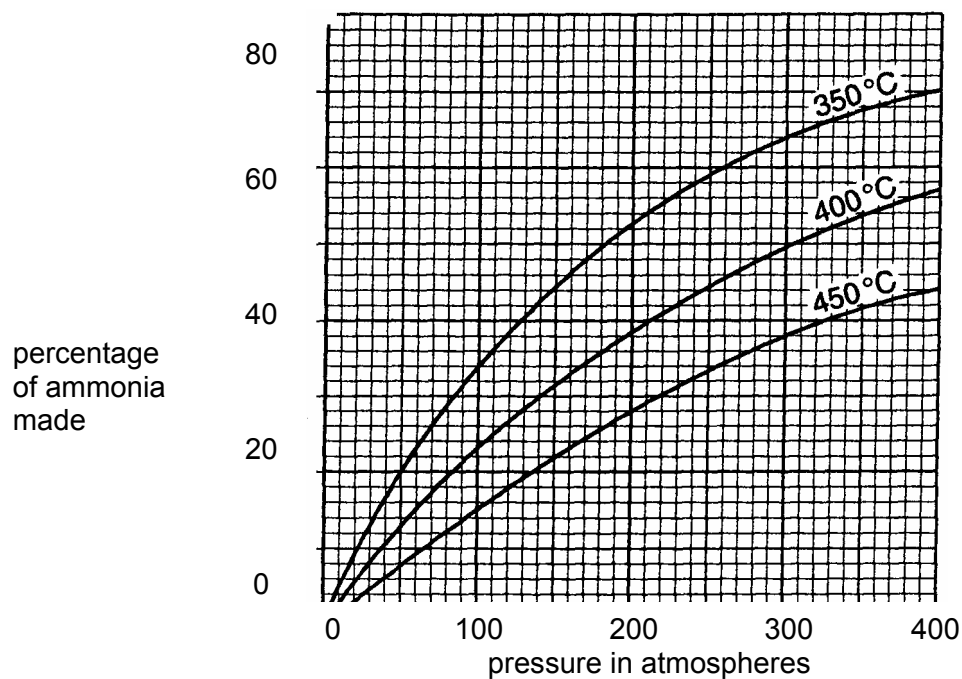
.....

.....[3]



(b) Look at the graphs.

They show the percentage of ammonia made in the converter at different temperatures and pressures.



(i) Look at the graph for 350 °C.

The percentage of ammonia changes as the pressure increases.

Describe how.

.....[1]

(ii) Look at the graphs.

The percentage of ammonia changes as the temperature increases.

Describe how.

.....[1]

(iii) Look at the graphs.

Write down a temperature and a pressure which make 20% of ammonia.

Temperature ..... °C

Pressure ..... atmospheres

[1]

[Total: 6]

**Section 2**

5. Mary weighs a crucible with some magnesium inside it.

She heats the crucible until the magnesium burns.

Then she re-weighs the crucible.

The mass gets heavier. Explain why.

.....

.....

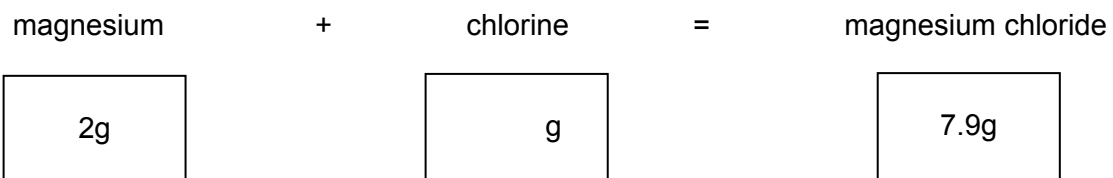
.....[3]

[Total: 3]

6. A scientist burns 2g of magnesium in chlorine.

The magnesium turns into 7.9g of magnesium chloride.

How much chlorine was used? Write your answer in the box.



[1]

[Total: 1]

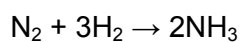
7. (a) One of these reactions can form an equilibrium

Tick (✓) the correct box.

$2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}$	<input type="checkbox"/>
$2\text{H}_2\text{O} \longrightarrow 2\text{H}_2 + \text{O}_2$	<input type="checkbox"/>
$2\text{NO}_2 \rightleftharpoons \text{N}_2\text{O}_4$	<input type="checkbox"/>
$\text{H}_2 + \text{Cl}_2 \longrightarrow 2\text{HCl}$	<input type="checkbox"/>

[1]

- (b) The equation for the forward reaction in an equilibrium is



Write the equation for the reverse reaction

.....[1]

- (c) Ali says that when equilibrium is reached the amounts of reactants and products don't change. He says that this means the reaction has stopped.

Jill says Ali is wrong.

Why is Jill right?

.....  
 .....  
 .....  
 .....[3]

[Total: 5]

8. Some breakfast cereals are sold in 'single helping' packs.

Arthur looks at the pack to see what it contains.

<p><b>20gram</b></p> <p>OCR CEREAL</p>
--

<b>OCR CEREAL</b>		
Nutritional Information Per 100g		
ENERGY	1574	kJ
PROTEIN	7	g
CARBOHYDRATES	85	g
of which sugars	8	g
starch	77	g
MINERALS		[%RDA*]
IRON	7.9mg	[55]
* Recommended Daily Allowance		

- (a) What mass of cereal is inside the packet?

.....[1]

- (b) What mass of carbohydrate is in the 20g packet?

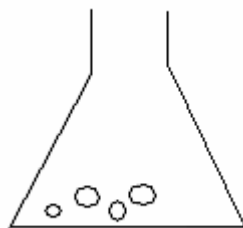
.....[1]

- (c) Arthur says that the pack of cereal will give him 55% of the recommended daily allowance of iron. This is NOT true. Explain why.

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

[Total: 4]

9. Mary put some marble chips into a flask.



She added acid and watched the marble chips react.

When the reaction had stopped there were some marble chips left in the flask.

- (a) How can Mary see if the reaction has stopped?

.....[1]

- (b) Explain why the reaction has stopped.

.....

.....[1]

- (c) Explain what will happen if Mary adds more acid to the flask.

.....

.....[2]

[Total: 4]

10. Mary electrolyses a solution of potassium chloride.

She keeps the current constant.

The experiment gives off 20 cm<sup>3</sup> of gas in 5 minutes.

How much gas is given off in 1 minute?

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

[Total: 1]

11. Potassium chloride is made of ions.

Solid potassium chloride does not conduct electricity.

Melted potassium chloride does conduct electricity.

Why does potassium chloride start to conduct when it is melted?

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

[Total: 2]



**Section 3**

12. large amounts of ethanol,  $C_2H_5OH$ , are available in Western Europe.

(a) Which one of the following is a raw material used to make ethanol?

Put a tick (✓) the correct box.

<b>air</b>	
<b>glucose from plants</b>	
<b>rock salt</b>	
<b>sea water</b>	

[1]

(b) In industry ethene,  $C_2H_4$ , is used to make ethanol,  $C_2H_5OH$ .

Write about how ethene is made into ethanol.

You should include

- the other materials used
- the conditions used

.....

.....

.....

.....

.....

.....

[3]

(c) Ethanol has many uses.

Write down **two** uses of ethanol.

Choose from the list

**detergent**

**fire extinguisher**

**fuel**

**solvent**

.....[2]

[Total: 6]

**13.** A car manufacturer is making a car powered by a hydrogen-oxygen fuel cell.

Water is the only substance made in the cell.

**(a)** The fuel cell provides energy to power the car.

What is this form of energy?

.....[1]

**(b)** The car manufacturer is developing hydrogen-oxygen fuel cells to replace petrol engines

Suggest why.

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

[Total: 3]

14. Rock salt is a very important raw material.

It is purified and dissolved in water to make sodium chloride solution (brine).

(a) Sodium chloride solution can be made into three useful substances.

These are chlorine, hydrogen and sodium hydroxide.

What is the name of the process used to change sodium chloride solution into these useful substances.

Choose a process from the list.

**distillation**

**electrolysis**

**filtration**

**precipitation**

.....[1]

(b) Chlorine, hydrogen and sodium hydroxide have many uses.

Draw a straight line from each substance to the correct use. [2]

**substance**

**use**

chlorine

to make soap

hydrogen

to make margarine

sodium hydroxide

to make household bleach

[Total: 3]

15. Sam investigates the hardness of different water samples.

He uses distilled water and two other samples labelled **A** and **B**.

He adds soap solution to 100 cm<sup>3</sup> of each sample until a lasting lather is formed.

Sam boils fresh 100 cm<sup>3</sup> samples of distilled water, sample **A** and sample **B**.

He repeats the test with soap solution on the boiled samples.

Look at the table. It shows his results.

sample	volume of soap solution needed to give a lather using	
	unboiled water in cm <sup>3</sup>	using boiled water in cm <sup>3</sup>
distilled water	1.0	1.0
<b>A</b>	9.5	1.0
<b>B</b>	13.0	7.0

(a) **Sample A** contains only temporary hardness.

How can you tell from the results?

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

(b) **Sample B** contains equal amounts of temporary and permanent hardness.

How can you tell from the information in the table of results?

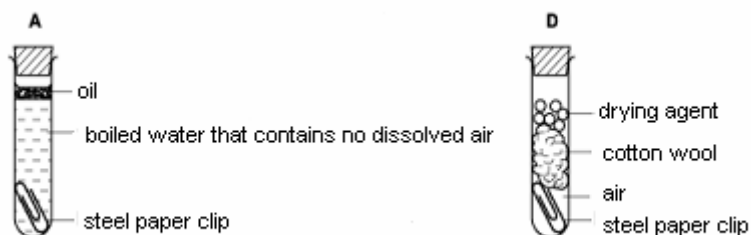
.....  
.....[1]

[Total: 2]

**16** This question is about rusting.

Look at the diagrams.

They show some steel paper clips that have been left for a few days in different conditions.



**(a)** There is no rust on the paper clip in test tube **A**.

Explain why.

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

**(b)** There is no rust on the paper clip in test tube **B**.

Explain why.

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

[Total: 2]

17. Chlorofluorocarbons, CFCs, are atmospheric pollutants in the stratosphere.

They contribute to ozone depletion in the stratosphere..

Ozone depletion is causing more dangerous ultra-violet light reaching the Earth's surface.

(a) Write down the names of the three elements chemically combined in a CFC.

.....[1]

(b) Scientists are concerned that more ultra-violet radiation is reaching the Earth's surface.

Explain why they are concerned.

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

(c) Scientists began research on the effect of CFCs in the stratosphere over thirty years ago.

A few years ago the United Kingdom government banned the use of CFCs.

Suggest how scientists communicated their concerns about CFCs and ozone depletion to government.

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

[Total: 4]

# The Periodic Table of the Elements

1	2											3	4	5	6	7	8																		
		Key												1 <b>H</b> hydrogen 1		4 <b>He</b> helium 2																			
relative atomic mass <b>atomic symbol</b> name atomic (proton) number												11 <b>B</b> boron 5		12 <b>C</b> carbon 6		14 <b>N</b> nitrogen 7		16 <b>O</b> oxygen 8		19 <b>F</b> fluorine 9		20 <b>Ne</b> neon 10													
23 <b>Na</b> sodium 11		24 <b>Mg</b> magnesium 12												27 <b>Al</b> aluminium 13		28 <b>Si</b> silicon 14		31 <b>P</b> phosphorus 15		32 b sulfur 16		35.5 <b>Cl</b> chlorine 17		40 <b>Ar</b> argon 18											
39 <b>K</b> potassium 19		40 <b>Ca</b> calcium 20		45 <b>Sc</b> scandium 21		48 <b>Ti</b> titanium 22		51 <b>V</b> vanadium 23		52 <b>Cr</b> chromium 24		55 <b>Mn</b> manganese 25		56 <b>Fe</b> iron 26		59 <b>Co</b> cobalt 27		59 <b>Ni</b> nickel 28		63.5 <b>Cu</b> copper 29		65 <b>Zn</b> zinc 30		70 <b>Ga</b> gallium 31		73 <b>Ge</b> germanium 32		75 <b>As</b> arsenic 33		79 <b>Se</b> selenium 34		80 <b>Br</b> bromine 35		84 <b>Kr</b> krypton 36	
85 <b>Rb</b> rubidium 37		88 <b>Sr</b> strontium 38		89 <b>Y</b> yttrium 39		91 <b>Zr</b> zirconium 40		93 <b>Nb</b> niobium 41		96 <b>Mo</b> molybdenum 42		[98] <b>Tc</b> technetium 43		101 <b>Ru</b> ruthenium 44		103 <b>Rh</b> rhodium 45		106 <b>Pd</b> palladium 46		108 <b>Ag</b> silver 47		112 <b>Cd</b> cadmium 48		115 <b>In</b> indium 49		119 <b>Sn</b> tin 50		122 <b>Sb</b> antimony 51		128 <b>Te</b> tellurium 52		127 <b>I</b> iodine 53		131 <b>Xe</b> xenon 54	
133 <b>Cs</b> caesium 55		137 <b>Ba</b> barium 56		139 <b>La*</b> lanthanum 57		178 <b>Hf</b> hafnium 72		181 <b>Ta</b> tantalum 73		184 <b>W</b> tungsten 74		186 <b>Re</b> rhenium 75		190 <b>Os</b> osmium 76		192 <b>Ir</b> iridium 77		195 <b>Pt</b> platinum 78		197 <b>Au</b> gold 79		201 <b>Hg</b> mercury 80		204 <b>Tl</b> thallium 81		207 <b>Pb</b> lead 82		209 <b>Bi</b> bismuth 83		[209] <b>Po</b> polonium 84		[210] <b>At</b> astatine 85		[222] <b>Rn</b> radon 86	
[223] <b>Fr</b> francium 87		[226] <b>Ra</b> radium 88		[227] <b>Ac*</b> actinium 89		[261] <b>Rf</b> rutherfordium 104		[262] <b>Db</b> dubnium 105		[266] <b>Sg</b> seaborgium 106		[264] <b>Bh</b> bohrium 107		[277] <b>Hs</b> hassium 108		[268] <b>Mt</b> meitnerium 109		[271] <b>Ds</b> darmstadtium 110		[272] <b>Rg</b> roentgenium 111		Elements with atomic numbers 112-116 have been reported but not fully authenticated													

\* *The Lanthanides (atomic numbers 58-71) and the Actinides (atomic numbers 90-103) have been omitted.*

*Cu and Cl have not been rounded to the nearest whole number.*



**GCSE**

**CHEMISTRY B**

Chemistry B Unit 2: Modules C4, C5, C6

**Specimen Mark Scheme**

Maximum mark for this paper is 60

**F**

**B642/01**

60 mins

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**This specimen mark scheme consists of 4 printed pages.**



Question Number	Answer	Max Mark
<b>Section 2</b> <b>5</b>	<b>Any three from</b> Oxygen [from the] air Combines / reacts With magnesium Forms magnesium oxide	<b>[3]</b>
	<b>Total Marks</b>	<b>[3]</b>
<b>6</b>	5.9	<b>[1]</b>
	<b>Total marks</b>	<b>[1]</b>
<b>7(a)</b> <b>7(b)</b> <b>7(c)</b>	$2\text{NO}_2 \rightleftharpoons \text{N}_2\text{O}_4$ $2\text{NH}_3 \rightarrow \text{N}_2 + 3\text{H}_2$ Amounts of reactants / products constant Reaction continues Rates equal	<b>[1]</b> <b>[1]</b> <b>[1]</b> <b>[1]</b> <b>[1]</b>
	<b>Total marks</b>	<b>[5]</b>
<b>8(a)</b> <b>8(b)</b> <b>8(c)</b>	20g 17g Realises that RDA is for 100g Realises that pack size less than 100g	<b>[1]</b> <b>[1]</b> <b>[1]</b> <b>[1]</b>
	<b>Total marks</b>	<b>[5]</b>
<b>9(a)</b> <b>9(b)</b> <b>9(c)</b>	Bubbles stop Acid used up Reaction starts again With unreacted marble chips	<b>[1]</b> <b>[1]</b> <b>[1]</b> <b>[1]</b>
	<b>Total marks</b>	<b>[4]</b>
<b>10</b>	4cm <sub>3</sub>	<b>[1]</b>
	<b>Total marks</b>	<b>[1]</b>
<b>11</b>	Icons move In liquid [only] / during conduction	<b>[1]</b> <b>[1]</b>
	<b>Total marks</b>	<b>[2]</b>

