

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

0240/01

**ADDITIONAL SCIENCE
FOUNDATION TIER
CHEMISTRY 2**

A.M. THURSDAY, 26 January 2012

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	
2.	5	
3.	3	
4.	7	
5.	5	
6.	4	
7.	5	
8.	6	
9.	3	
10.	6	
Total	50	

0240-010001

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

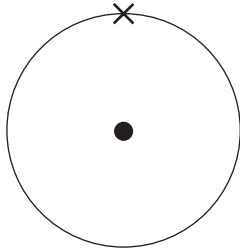
The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

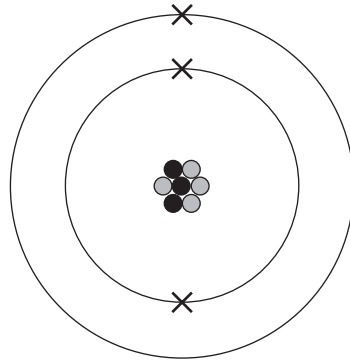
The Periodic Table is printed on the back cover of the examination paper and the formulae for some common ions on the inside of the back cover.

Answer **all** questions.

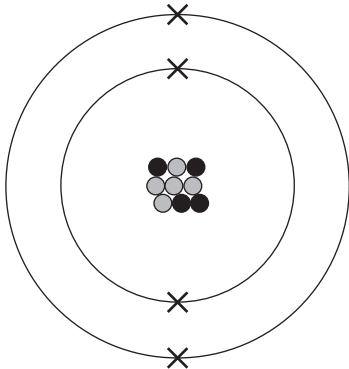
1. The following diagrams represent four different atoms, **A**, **B**, **C** and **D**.



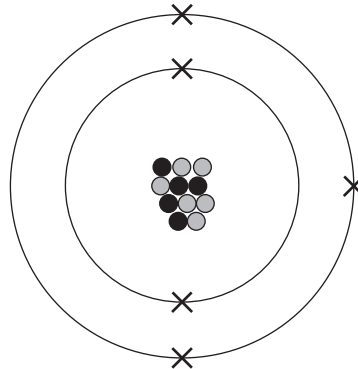
A



B



C



D

Key: ● proton
 ○ neutron
 × electron

(a) State which of the above diagrams, **A**, **B**, **C** or **D**,

(i) has five neutrons,

[1]

(ii) has three electrons,

[1]

(iii) represents an atom of hydrogen.

[1]

(b) Give the

(i) atomic number of **D**,

.....

[1]

(ii) mass number of **B**.

.....

[1]

(c) Give the name of the part of an atom where protons and neutrons are found.

[1]

.....

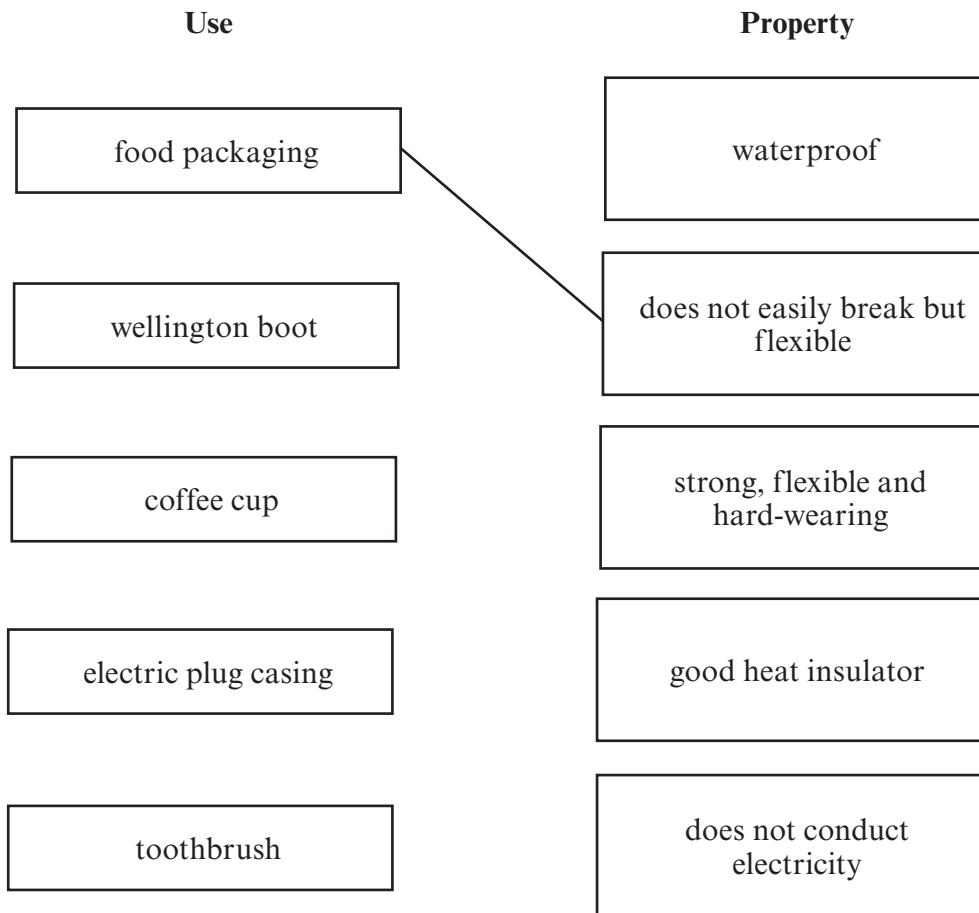
2. (a) Some uses and properties of plastics are listed below.

Draw a line to link each use to the property upon which that use relies.

One has already been done for you.

Each property should be used once only.

[3]



- (b) Polythene is an example of a plastic.

Give the name of **one** other plastic.

..... [1]

- (c) Plastics are often used to make dustbins. Apart from cost, give **one** reason why dustbins are often made from plastic rather than from a metal such as iron. [1]

.....

3. (a) Nitinol is an example of a shape memory alloy.

Place a tick (✓) in the boxes next to the **two** uses of shape memory alloys. [2]

absorb toxic chemicals

superelastic spectacle frames

artificial muscles

nappies

coffeepot thermostats

- (b) Some sunglasses have lenses that change colour in sunlight.

From the box below, choose the type of smart material that can be used in these lenses. [1]

photochromic pigment

polymer gel

thermochromic pigment

.....

4. (a) A student carried out some experiments to investigate the reactivity of three different metals, **A**, **B** and **C**.

Metal	With cold water	With hot water	With steam
A	slow reaction	rapid reaction	very vigorous reaction
B	vigorous reaction	experiment not attempted	experiment not attempted
C	no reaction	no reaction	slow reaction

Arrange metals **A**, **B** and **C** in order of **decreasing** reactivity.

[1]

Most reactive

.....

Least reactive

- (b) The order of reactivity of some common metals is shown below.

Most reactive potassium
 sodium
 magnesium
 aluminium
 iron
 copper
 silver
Least reactive gold

- (i) Complete the **word equation** for the reaction that takes place between magnesium and copper sulphate solution. [1]



- (ii) Only **two** of the following pairs of substances react together.
Place a tick (✓) in the boxes next to **both**.

[2]

aluminium and copper oxide

copper and silver nitrate solution

gold and magnesium oxide

iron and aluminium oxide

silver and copper sulphate solution

- (iii) Magnesium reacts very slowly with cold water. Predict how silver reacts with cold water, giving a reason for your answer.

[2]

.....

.....

.....

- (c) Aluminium is a reactive metal found near the top of the reactivity series.

Name the method used in its extraction.

[1]

.....

5. (a) The following table contains some information about five substances.

Substance	Symbol/ formula	Melting point/ $^{\circ}\text{C}$	Boiling point/ $^{\circ}\text{C}$	Density / g cm^{-3}	Solubility in water	Structure
methane	CH_4	-182	-162	0.0007	insoluble	simple molecular
graphite	C	4000	5100	2.1	insoluble	giant covalent
sodium chloride	NaCl	801	1413	2.17	soluble	giant ionic
aluminium	Al	660	2470	2.7	insoluble	metallic
potassium bromide	KBr	734	1435	2.75	soluble

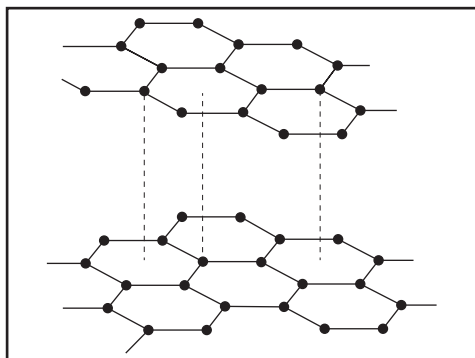
- (i) Complete the table by giving the structure of potassium bromide. [1]
- (ii) Calcium has a metallic structure.

From the values in the following box, choose the approximate melting point of calcium.

-200	100	850	4500
------	-----	-----	------

Approximate melting point of calcium is $^{\circ}\text{C}$ [1]

- (iii) Which of the five substances named in the above table is represented by the following diagram?



represents [1]

(b) The table below shows information about four substances, **A**, **B**, **C** and **D**.

Substance	Melting point/ $^{\circ}\text{C}$	Boiling point/ $^{\circ}\text{C}$	Density / gcm^{-3}
A	-101	-35	0.0032
B	1650	2230	2.6
C	-7	59	3.12
D	44	280	1.82

(i) State which substance could have a giant covalent structure.

[1]

.....

(ii) The other three substances all have the same type of structure.

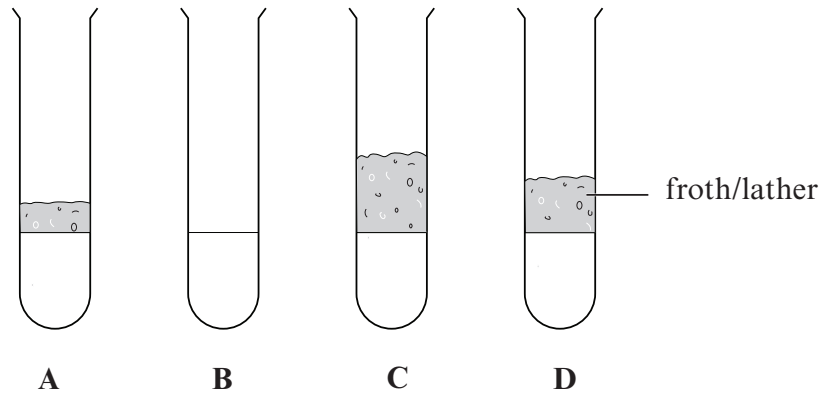
Name the type of structure.

[1]

.....

6. 2 cm³ of soap solution was shaken the same number of times with equal volumes of four different water samples, **A**, **B**, **C** and **D**.

The results are shown in the diagram below.



- (a) State which water sample, **A**, **B**, **C** or **D**, is the softest and give a reason for your choice. [2]

Softest water

Reason

- (b) Describe what could be done to sample **B** to obtain a lather when using the same volume of soap solution. [1]

.....

.....

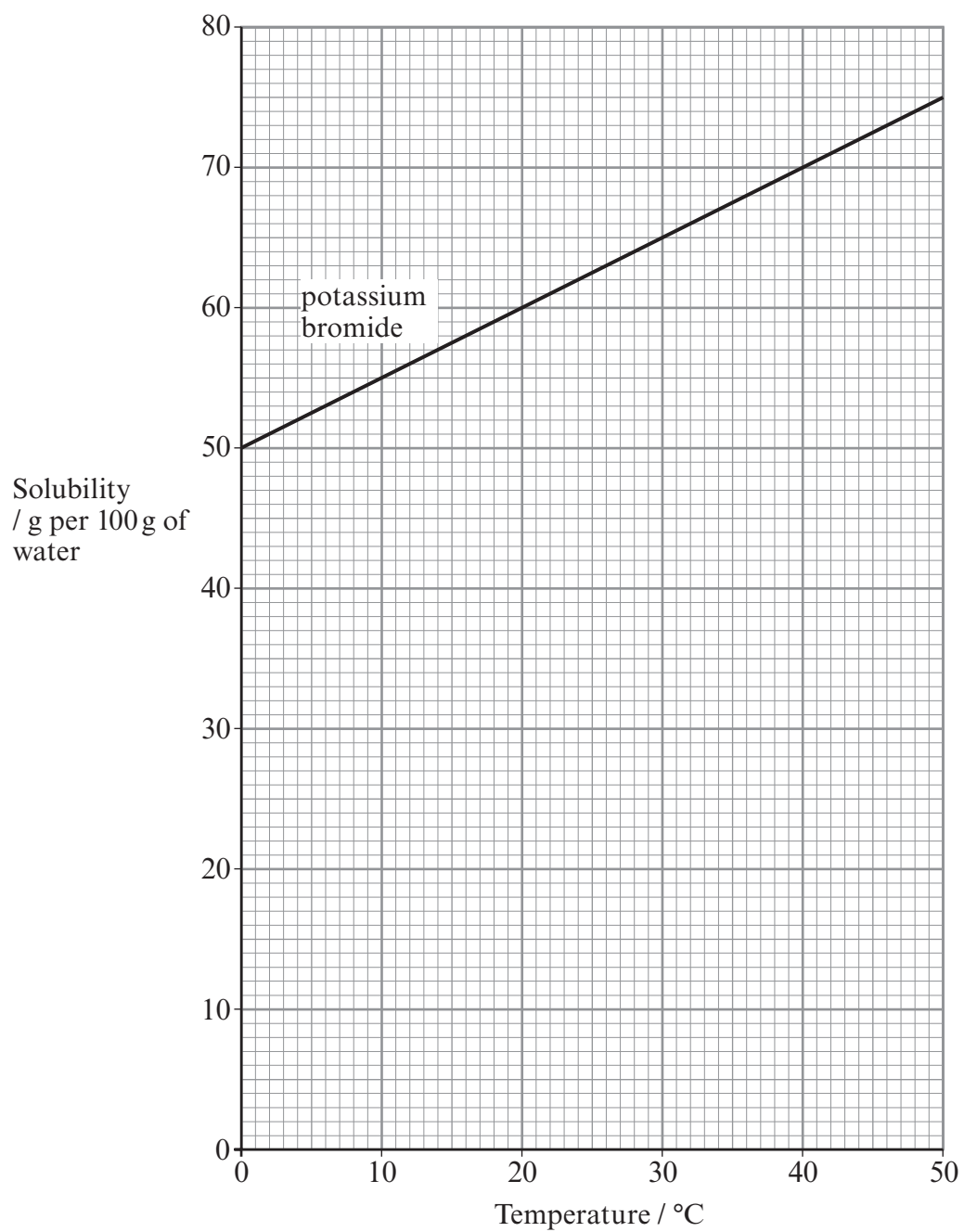
- (c) Give **one** advantage of living in a hard water area. [1]

.....

.....

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7. The graph below shows the solubility of potassium bromide in water at different temperatures.



The following table gives the solubility of potassium nitrate in water at different temperatures.

Temperature/°C	0	10	20	30	40	50
Solubility/g per 100 g of water	15	23	34	46	61	80

(a) Plot the results from the table on the grid opposite and then draw a **smooth curve** through the points. [3]

(b) Use the graph to find

(i) the solubility of potassium nitrate at 25°C, [1]

..... g per 100 g of water

(ii) the temperature when the solubility of both substances is the same. [1]

..... °C

8. (a) Complete the following table of information about some elements.

The Periodic Table of Elements shown on the **back cover of this examination paper** may help in answering this question. [4]

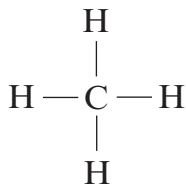
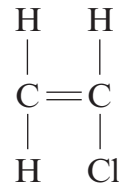
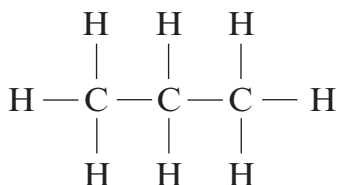
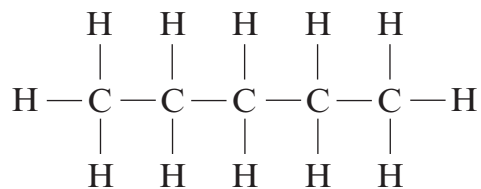
Element	Symbol	Number of protons	Number of neutrons	Number of electrons
carbon	${}_{6}^{12}\text{C}$		6	6
magnesium	${}_{12}^{24}\text{Mg}$	12	12	
phosphorus	${}_{15}^{31}\text{P}$	15		15
argon		18	22	18

- (b) Calculate the relative molecular mass (M_r) of sulphuric acid, H_2SO_4 . [2]

$$A_r(\text{H}) = 1 \quad A_r(\text{O}) = 16 \quad A_r(\text{S}) = 32$$

$$M_r(\text{H}_2\text{SO}_4) = \dots\dots\dots$$

9. The following diagrams show the structural formulae of four substances, **A**, **B**, **C** and **D**.

**A****B****C****D**

(a) The molecular formula of **A** is CH_4 .

Give the molecular formula of **D**.

..... [1]

(b) Give the letter for the substance that is **not** a hydrocarbon.

..... [1]

(c) Butane contains four carbon atoms.

Draw the **structural** formula of butane.

[1]

10. (a) The following table contains the chemical names and formulae of some common fertilisers.

Name	Formula
sodium nitrate	NaNO_3
ammonium phosphate	$(\text{NH}_4)_3\text{PO}_4$
ammonium sulphate	$(\text{NH}_4)_2\text{SO}_4$
calcium nitrate	$\text{Ca}(\text{NO}_3)_2$

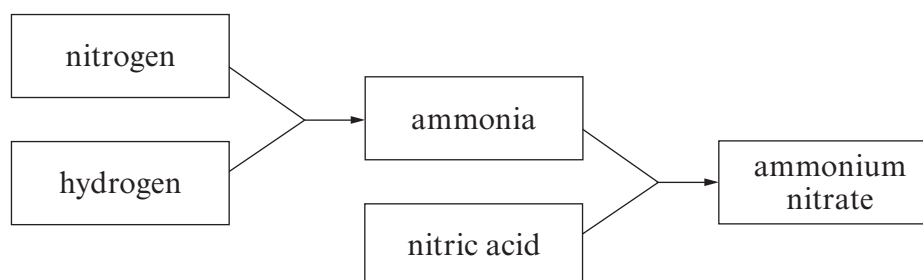
- (i) Name the **two** elements that are found in all the above fertilisers. [1]

..... and

- (ii) Name the acid used to neutralise ammonia in the production of ammonium sulphate. [1]

.....

- (b) The following flow diagram shows how ammonium nitrate is manufactured from nitrogen, hydrogen and nitric acid.



- (i) Which substance appearing in the flow diagram comes from the atmosphere? [1]

.....

- (ii) Complete the **word equation** for the formation of ammonium nitrate. [1]

..... + \longrightarrow ammonium nitrate

(c) When farmers use fertilisers, some fertiliser can be washed out of the soil into lakes. This can result in the overgrowth of algae. When algae die and decay, oxygen is removed from the lakes.

(i) State why farmers use fertilisers. [1]

.....
.....

(ii) Give **one** consequence of the removal of oxygen from lakes. [1]

.....
.....

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FORMULAE FOR SOME COMMON IONS

POSITIVE IONS		NEGATIVE IONS	
Name	Formula	Name	Formula
Aluminium	Al³⁺	Bromide	Br⁻
Ammonium	NH₄⁺	Carbonate	CO₃²⁻
Barium	Ba²⁺	Chloride	Cl⁻
Calcium	Ca²⁺	Fluoride	F⁻
Copper(II)	Cu²⁺	Hydroxide	OH⁻
Hydrogen	H⁺	Iodide	I⁻
Iron(II)	Fe²⁺	Nitrate	NO₃⁻
Iron(III)	Fe³⁺	Oxide	O²⁻
Lithium	Li⁺	Sulphate	SO₄²⁻
Magnesium	Mg²⁺		
Nickel	Ni²⁺		
Potassium	K⁺		
Silver	Ag⁺		
Sodium	Na⁺		

