

Candidate Name	Centre Number	Candidate Number
		0



**GCSE**

240/01

**ADDITIONAL SCIENCE  
FOUNDATION TIER  
CHEMISTRY 2**

A.M. MONDAY, 17 January 2011

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	
2.	2	
3.	4	
4.	4	
5.	8	
6.	11	
7.	6	
8.	9	
<b>Total</b>	<b>50</b>	

**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**

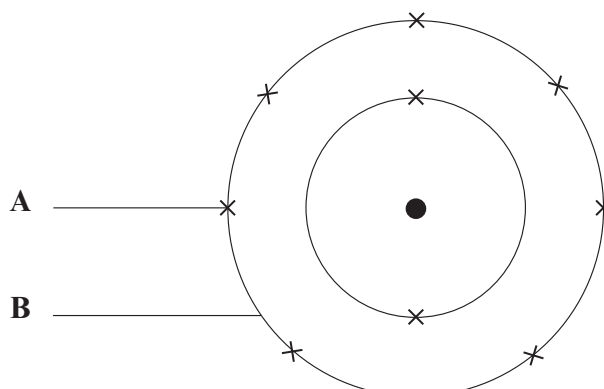
The number of marks is given in brackets at the end of each question or part-question.

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.

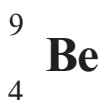
1. (i) The diagram below shows an atom of fluorine.



Use words from the box below to answer parts I and II.

electron	neutron	nucleus
orbit (shell)	proton	

- I. Name the particle labelled **A**. ..... [1]
- II. Name the part labelled **B**. ..... [1]
- (ii) A beryllium atom can be represented by the following symbol:



Use the numbers in the box below to complete sentences I, II and III.

2	3	4	5	9	13
---	---	---	---	---	----

Each number can be used once, more than once or not at all.

Complete the following sentences.

- I. Beryllium has ..... electrons. [1]
- II. The mass number of beryllium is ..... [1]
- III. Beryllium has ..... neutrons. [1]
- (iii) Atoms have **equal numbers** of positive protons and negative electrons.  
Give the overall charge of an atom. [1]

2. The calculation below shows how the relative molecular mass,  $M_r$ , of ammonia,  $\text{NH}_3$ , is found.

$$A_r(\text{H}) = 1; \quad A_r(\text{N}) = 14$$

$$M_r(\text{NH}_3) = 14 + 1 + 1 + 1 = 17$$

Tick (✓) the boxes next to the **two** substances which **both** have a relative molecular mass ( $M_r$ ) of 28. [2]

$$A_r(\text{H}) = 1; \quad A_r(\text{C}) = 12; \quad A_r(\text{N}) = 14$$

$$A_r(\text{O}) = 16; \quad A_r(\text{S}) = 32.$$

carbon monoxide,  $\text{CO}$

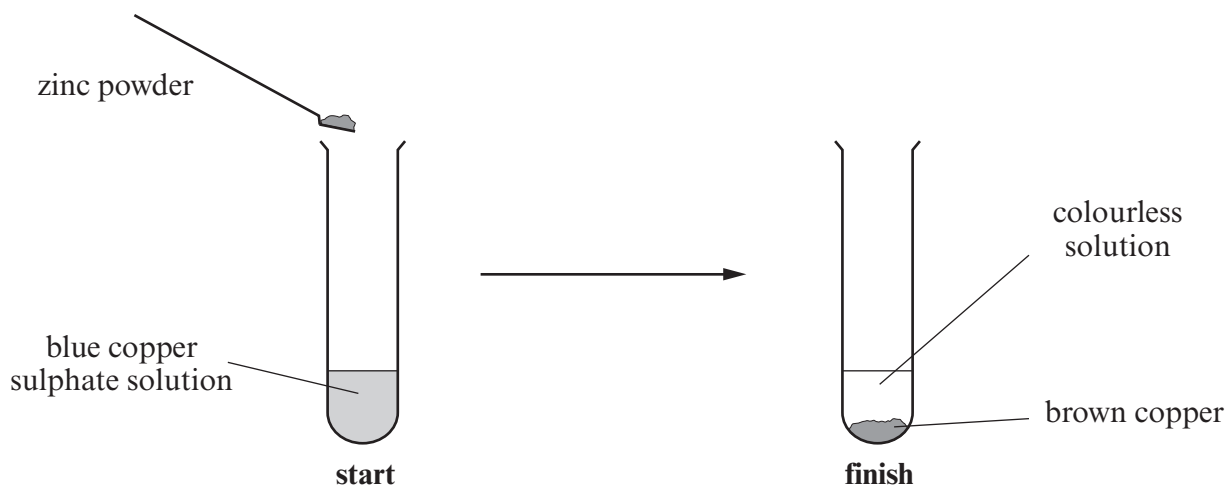
hydrogen peroxide,  $\text{H}_2\text{O}_2$

hydrogen sulphide,  $\text{H}_2\text{S}$

nitrogen,  $\text{N}_2$

nitrogen oxide,  $\text{NO}$

3. (i) A pupil carried out an experiment that involved adding excess zinc powder to blue copper sulphate solution. During the reaction, the blue solution became colourless and some brown copper was formed.

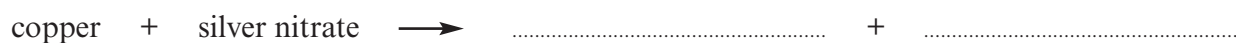


The reaction that took place can be shown by the following word equation.



- I. The above experiment was then repeated using copper powder and silver nitrate solution.

During the reaction, a blue solution and a grey solid were formed. Complete the following **word equation**. [1]



- II. Use the results of the above two experiments to place copper, silver and zinc in order of **decreasing** reactivity. [1]

**most reactive** .....

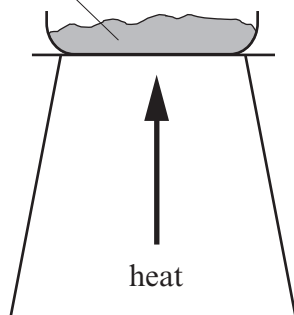
.....

**least reactive** .....

- (ii) Aluminium is a more reactive metal than iron.

A mixture of aluminium powder and iron oxide was heated strongly using the equipment shown. A violent reaction took place with lots of heat being given out.

mixture of aluminium  
and iron oxide



Give the **word equation** for the reaction that took place.

[2]

..... + ..... → ..... + .....

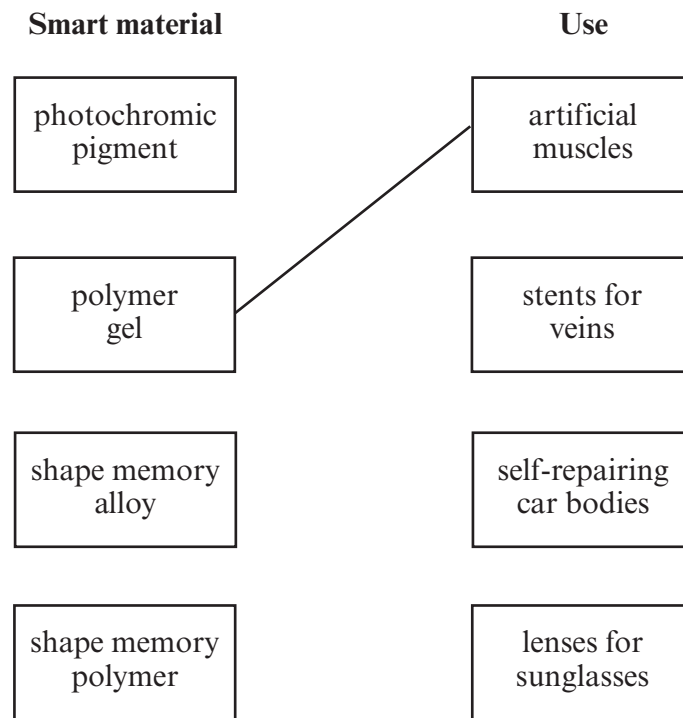
0510  
0110005

4. (i) Photochromic pigments, polymer gels, shape memory alloys and shape memory polymers are all examples of smart materials.

Draw a line to connect **each** smart material to its correct use.

[2]

**One has already been done for you.**



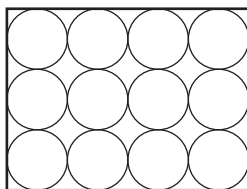
- (ii) Nitinol (NiTi) is an example of a shape memory alloy.

I. State the **special** property of shape memory alloys.

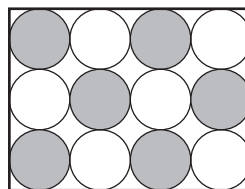
[1]

II. State which of the following, **A**, **B** or **C**, best represents the structure of solid nitinol.

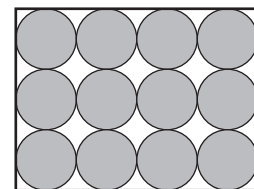
[1]



A



B

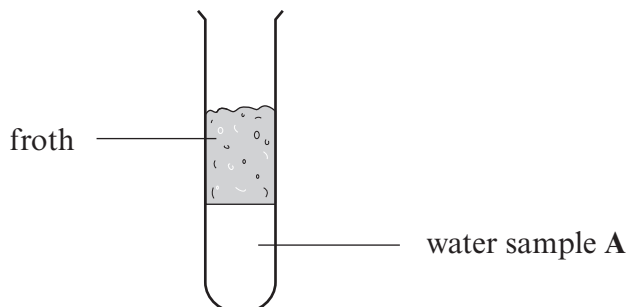


C

The structure of nitinol is best represented by .....

**BLANK PAGE**

5.  $1\text{ cm}^3$  of soap solution was shaken for 10 seconds with  $10\text{ cm}^3$  of water sample A. The height of the froth was measured.



The experiment was then repeated with water samples **B**, **C**, **D** and **E**.

- (i) State **two** ways of making sure that the investigation was made a fair test. [2]

.....

.....

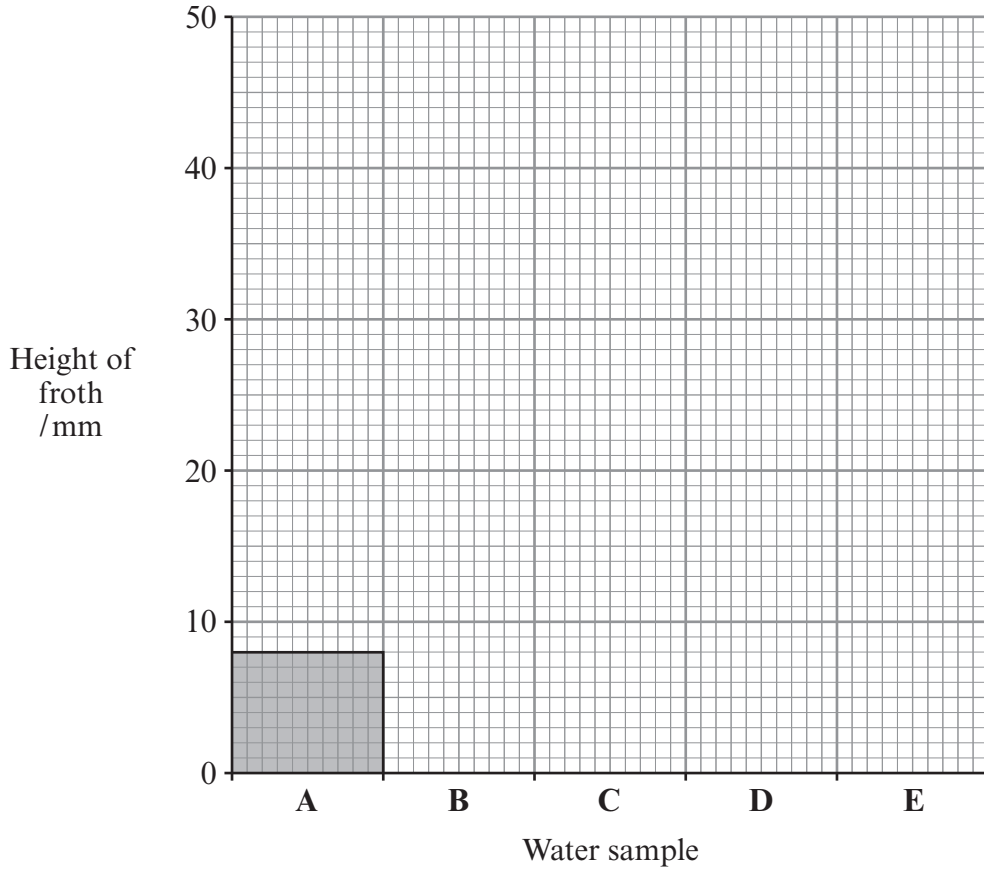
- (ii) The results of the experiments are shown in the table below.

Water sample	Height of froth/mm
<b>A</b>	8
<b>B</b>	41
<b>C</b>	2
<b>D</b>	13
<b>E</b>	39



Complete the bar chart of the results on the grid below.  
**The result for water sample A has already been done for you.**

[2]



(iii) State which sample was the hardest water and explain your answer.

[2]

*Sample* .....

*Explanation* .....

(iv) Tick (✓) **two** boxes to show two possible methods for softening hard water.

[2]

adding sodium chloride

adding calcium carbonate

freezing

adding sodium carbonate

boiling

6. (a) The boxes below contain some information about nitrogen and ammonia.

<p>Nitrogen, N<sub>2</sub></p> <p>colourless gas no smell slightly soluble in water neutral used in packaging crisps</p>
------------------------------------------------------------------------------------------------------------------------------------------

<p>Ammonia, NH<sub>3</sub></p> <p>colourless gas pungent smell very soluble in water alkaline used in making fertilisers</p>
----------------------------------------------------------------------------------------------------------------------------------------------

Use the information in the boxes to answer parts (i) and (ii).

- (i) Give the **names** of the two elements present in ammonia. [1]

..... and .....

- (ii) State **one similar property** and **one different property** of nitrogen and ammonia. [2]

*Similar property*

.....

*Different property*

.....

- (iii)

<b>giant covalent</b>	<b>giant ionic</b>
<b>simple molecular</b>	<b>metallic</b>

Choose the structure from the box above to complete the following sentence. [1]

Nitrogen and ammonia are examples of substances which have a

..... structure.

- (b) (i) Ammonia reacts with sulphuric acid to give a substance that can be used as a fertiliser.

Give the **word equation** for the reaction that takes place. [2]

..... + ..... → .....

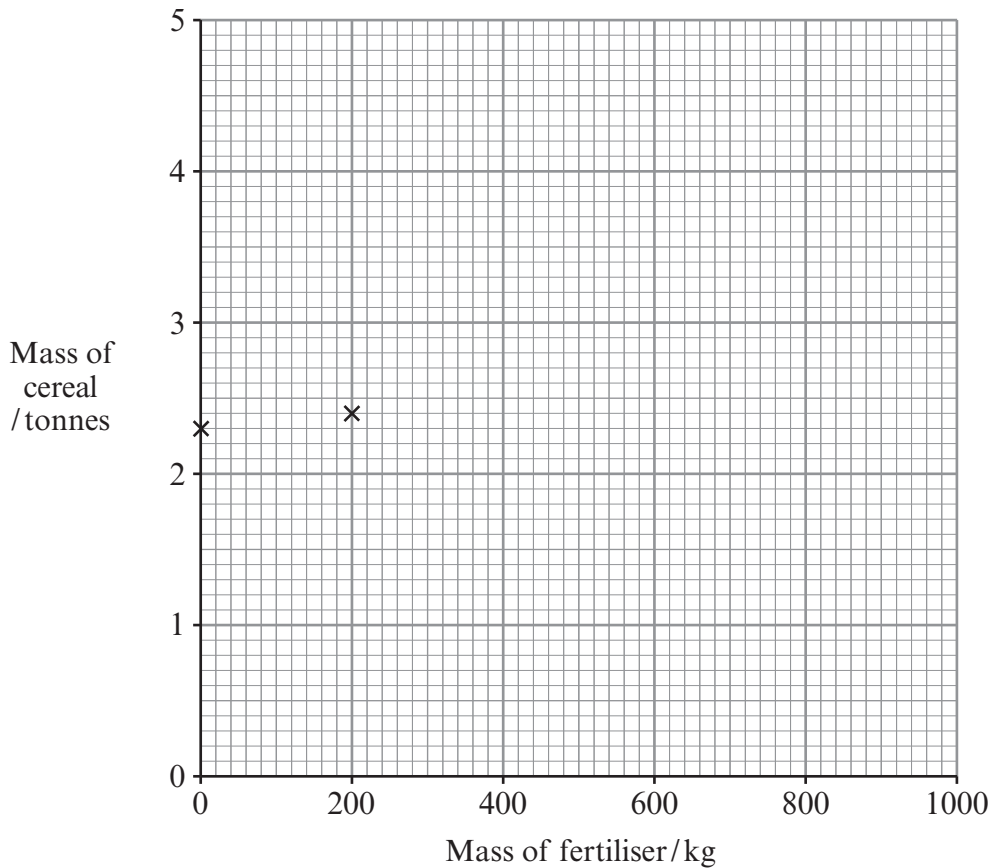
- (ii) State the type of reaction that takes place between ammonia and sulphuric acid. [1]

.....

(c) The table below shows the mass, in tonnes, of cereal produced from every hectare of land using different masses of fertilisers.

Mass of fertiliser / kg	Mass of cereal / tonnes
0	2.3
200	2.4
400	2.8
600	3.8
800	4.4
1000	4.6

(i) Plot the points on the grid below and draw a **smooth curve** through **all** the points. **Two points have been plotted for you.** [3]



(ii) Use the graph to find the mass of cereal you would expect to be produced using 700 kg of fertiliser. [1]

..... tonnes

11

7. The following table contains some information about elements **A**, **B**, **C**, **D**, **E** and **F**. These letters are **not** chemical symbols.  
Element **F** has an error in its information.

Element	Mass number	Atomic number	Number of protons	Number of neutrons	Number of electrons
<b>A</b>	19	9	9	10	9
<b>B</b>	24	12	12	12	12
<b>C</b>	35	17	17	18	17
<b>D</b>	37	17	17	20	17
<b>E</b>	40	18	18	.....	18
<b>F</b>	40	20	20	20	21

Use the information in the table to answer parts (i) to (iv).

Each letter may be used once, more than once or not at all.

- (i) I. Complete the table above by giving the number of neutrons in element **E**. [1]  
 II. Use the Periodic Table of Elements on the back cover of this examination paper to decide which of the elements, **A**, **B**, **C**, **D**, **E** or **F**, is argon. [1]

.....

- (ii) One element appears **twice** in the above table. Give the **two** letters of that element and explain your choice. [2]

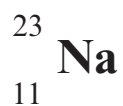
Letters ..... and .....

Explanation .....

.....

- (iii) State the error in the information about element **F**. [1]
- .....

- (iv) A sodium atom can be represented in the following way:



Write the information for element **A** in the same form. [1]



8. (a) Complete the following table.

[2]

Name	ethane	pentane
Formula	$C_2H_6$	
Structural formula		$  \begin{array}{ccccccccc}  & H & H & H & H & H & & & \\  &   &   &   &   &   & & & \\  H & -C & -C & -C & -C & -C & -H & & \\  &   &   &   &   &   & & & \\  & H & H & H & H & H & & &   \end{array}  $

(b) Polystyrene is an example of a polymer. Name **one other** polymer.

[1]

.....

(c) Different substances have different properties that allow them to be used in different ways.

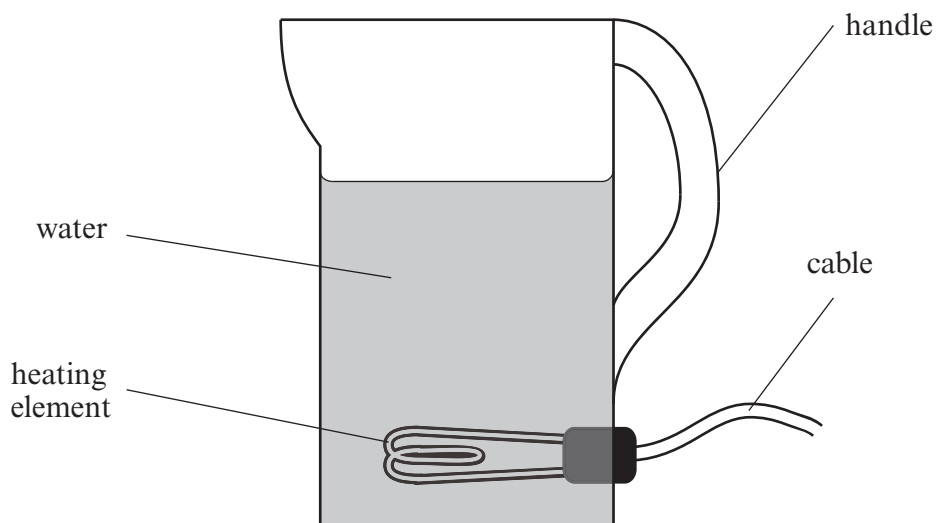
The following table contains information about five different substances labelled **A**, **B**, **C**, **D** and **E**.

Substance	Properties
<b>A</b>	gas at room temperature colourless does not conduct heat does not conduct electricity
<b>B</b>	solid at room temperature grey colour good conductor of electricity ductile
<b>C</b>	liquid at room temperature colourless does not conduct heat poor conductor of electricity
<b>D</b>	solid at room temperature white colour does not conduct electricity rigid does not melt easily on heating
<b>E</b>	solid at room temperature white colour does not conduct heat does not conduct electricity flexible

Use only the information in the table to answer parts (i), (ii) and (iii).

Each letter can be used once, more than once, or not at all.

The diagram below shows the main parts of a kettle.



State, giving **one** reason, which of the five substances, **A, B, C, D** or **E**, could be used to make the

- (i) heating element, [2]

*Substance* .....

*Reason* .....

- (ii) outer coating of the cable, [2]

*Substance* .....

*Reason* .....

- (iii) handle. [2]

*Substance* .....

*Reason* .....

**BLANK PAGE**



**BLANK PAGE**

**BLANK PAGE**

**FORMULAE FOR SOME COMMON IONS**

POSITIVE IONS		NEGATIVE IONS	
Name	Formula	Name	Formula
Aluminium	$\text{Al}^{3+}$	Bromide	$\text{Br}^-$
Ammonium	$\text{NH}_4^+$	Carbonate	$\text{CO}_3^{2-}$
Barium	$\text{Ba}^{2+}$	Chloride	$\text{Cl}^-$
Calcium	$\text{Ca}^{2+}$	Fluoride	$\text{F}^-$
Copper(II)	$\text{Cu}^{2+}$	Hydroxide	$\text{OH}^-$
Hydrogen	$\text{H}^+$	Iodide	$\text{I}^-$
Iron(II)	$\text{Fe}^{2+}$	Nitrate	$\text{NO}_3^-$
Iron(III)	$\text{Fe}^{3+}$	Oxide	$\text{O}^{2-}$
Lithium	$\text{Li}^+$	Sulphate	$\text{SO}_4^{2-}$
Magnesium	$\text{Mg}^{2+}$		
Nickel	$\text{Ni}^{2+}$		
Potassium	$\text{K}^+$		
Silver	$\text{Ag}^+$		
Sodium	$\text{Na}^+$		

