

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**GCSE**  
**TWENTY FIRST CENTURY SCIENCE**  
**A171/01**  
**CHEMISTRY A/SCIENCE A**  
**Modules C1 C2 C3 (Foundation Tier)**

**THURSDAY 15 MAY 2014: Morning**  
**DURATION: 1 hour**  
**plus your additional time allowance**

**MODIFIED ENLARGED**

<b>Candidate forename</b>		<b>Candidate surname</b>	
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<b>Centre number</b>						<b>Candidate number</b>				
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**Candidates answer on the Question Paper.**  
**A calculator may be used for this paper.**

**OCR SUPPLIED MATERIALS:**

**Periodic Table**

**OTHER MATERIALS REQUIRED:**

**Pencil**

**Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

**Write your name, centre number and candidate number in the boxes on the first page. 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).**

## **INFORMATION FOR CANDIDATES**

**The quality of written communication is assessed in questions marked with a pencil ()**.

**The Periodic Table is provided separately.**

**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.**

**Any blank pages are indicated.**

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Answer ALL the questions.

1 This question is about fuels that burn in car engines.

These fuels are hydrocarbons.

(a) (i) Hydrocarbons burn in plenty of air to make two products.

One product is carbon dioxide.

What is the OTHER product?

Put a **ring** around the correct answer.

chlorine

nitrogen

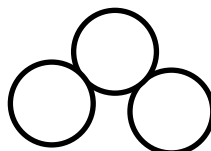
oxygen

water

[1]

(ii) Which diagram shows a molecule of carbon dioxide,  $\text{CO}_2$ ?

Put a **ring** around the correct answer.



[1]

**(b) Dom and Kate live in a town that has bus lanes.**

**ONLY buses can drive in bus lanes.**

**This means that at busy times buses travel faster than cars.**

**Buses and cars make carbon dioxide and other pollutants when they burn fuel.**

**Dom says there will be LESS air pollution as more people will travel by bus.**

**Kate says there will be MORE air pollution as a bus burns more fuel than a car.**

**Who is correct and why?**



**The quality of written communication will be assessed in your answer.**

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**[6]**

**[Total: 8]**

**2 Sulfur dioxide is a pollutant from coal-fired power stations.**

**(a) Sulfur dioxide is made from two elements.**

**Name these elements and say where they come from in a coal-fired power station.**

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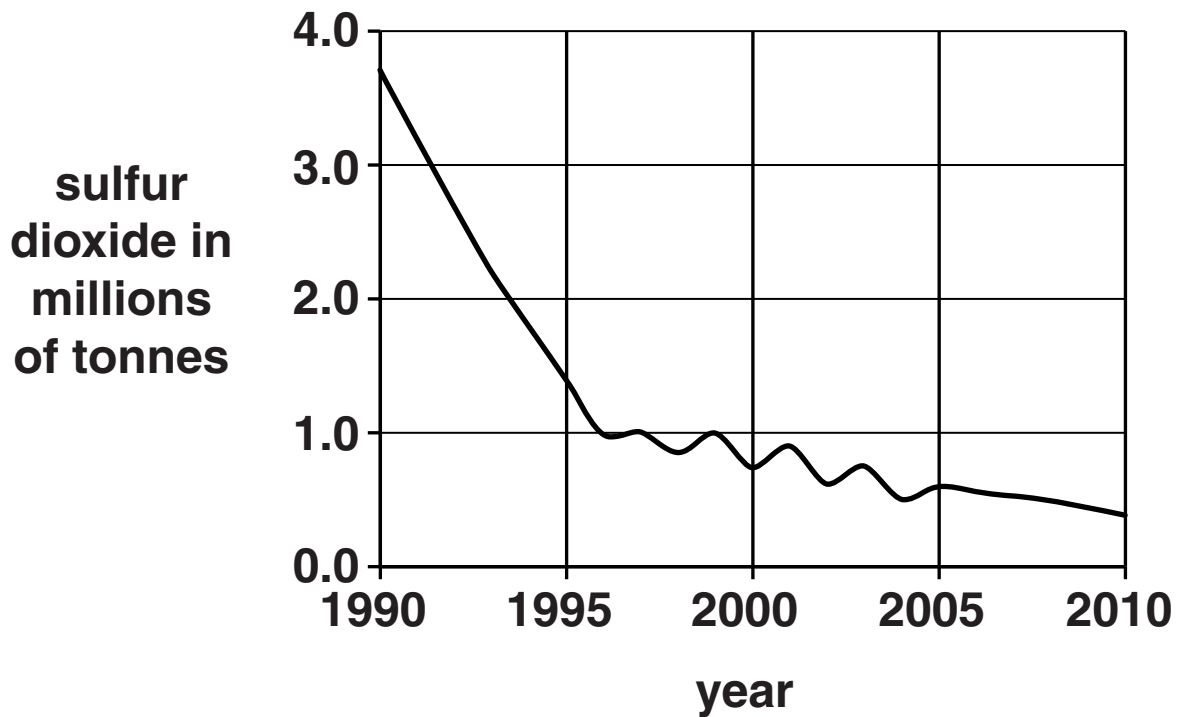
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**[2]**



**(b) The graph shows the amount of sulfur dioxide put into the air from 1990 to 2010.**



**Write THREE things that this graph shows about the amount of sulfur dioxide put into the air.**

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[3]

**(c) (i) Jake is a scientist.**

**Jake says, “Sulfur dioxide pollution has decreased as coal-fired power stations have shut down.”**

**This statement is an example of**

**a correlation**

**an estimation**

**an evaluation**

**a prediction**

**Put a ring around the correct answer. [1]**

**(ii) Shutting down coal-fired power stations is one way to lower the amount of sulfur dioxide put into the air.**

**Describe and explain ANOTHER way.**

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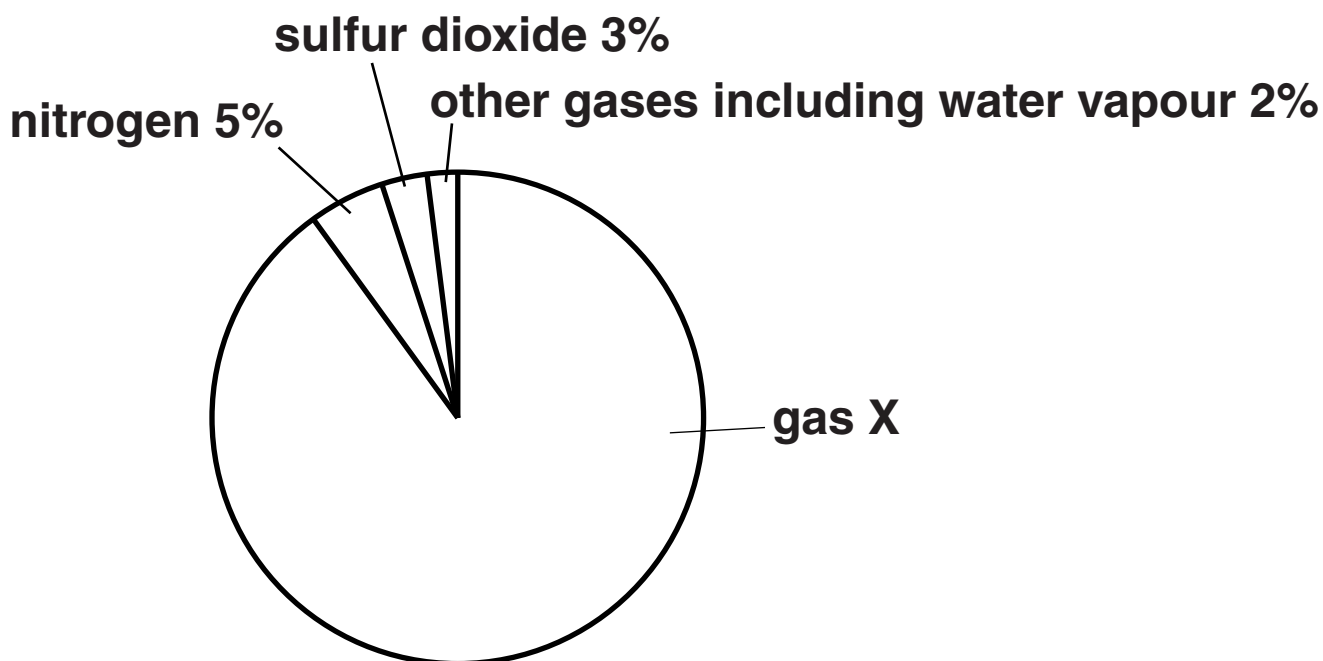
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**[2]**

**[Total: 8]**

- 3 Scientists have estimated the percentage of different gases in the atmosphere before plant life on Earth began.

The pie chart shows this estimation.



- (a) What is the gas X that made up most of the atmosphere before there was life on Earth?

Put a **ring** around the correct answer.

argon

carbon dioxide

nitrogen oxide

oxygen

[1]

**(b) Explain why the composition of the Earth's atmosphere changed after plant life on Earth began.**

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**[2]**

**[Total: 3]**

**4 A supermarket uses plastic carrier bags.**

**The handles of some of a NEW set of bags break when customers carry their shopping away.**

**The supermarket complains to the company that makes the bags.**

**The company tests 5 of the new set of bags.**

**They find the mass that will break each bag.**

**Here are their measurements.**

<b>Bag number</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Mass to break handle in kg</b>	<b>6.5</b>	<b>8.2</b>	<b>6.1</b>	<b>10.2</b>	<b>9.0</b>

**(a) (i) Use ALL their measurements to find the mean value of the mass to break the handles.**

**Show your working.**

\_\_\_\_\_ kg [2]

**(ii) What is the range of these measurements?**

\_\_\_\_\_ to \_\_\_\_\_ kg [1]

**(iii) Measurements on older bags have the same mean value.**

**The range for the older bags is 7.4 to 8.6 kg.**

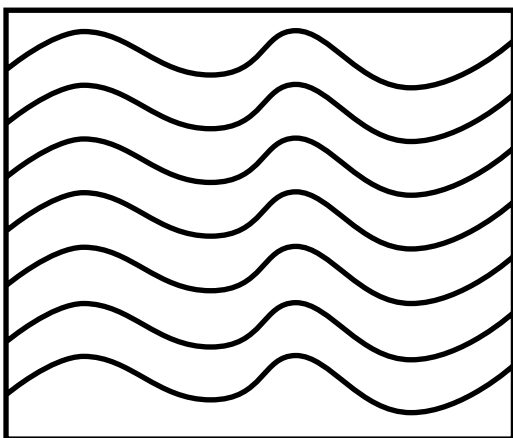
**Use this information and your answer to part (ii) to suggest why some of the new bags are breaking more easily than the old ones.**

\_\_\_\_\_  
\_\_\_\_\_ [1]

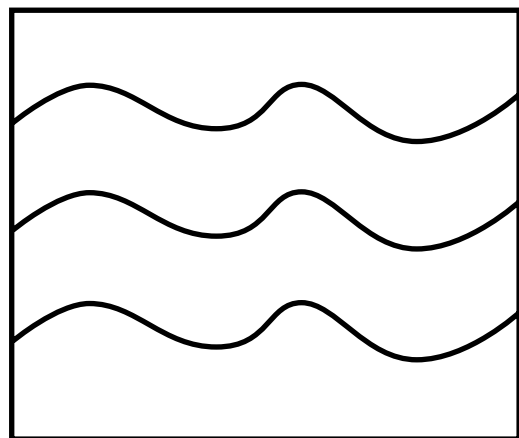
**(b) Carrier bags are made of polythene.**

**The diagrams show how the molecules are arranged in two types of polythene.**

**polythene A**



**polythene B**



- (i) Put a tick (✓) in the box next to the correct words to complete the sentence.

The density of polythene A is	higher than		the density of polythene B.
	lower than		
	the same as		

[1]

- (ii) Molecules that are CLOSER together have BIGGER forces between them.

Put a tick (✓) in the box next to the correct words to complete the sentence.

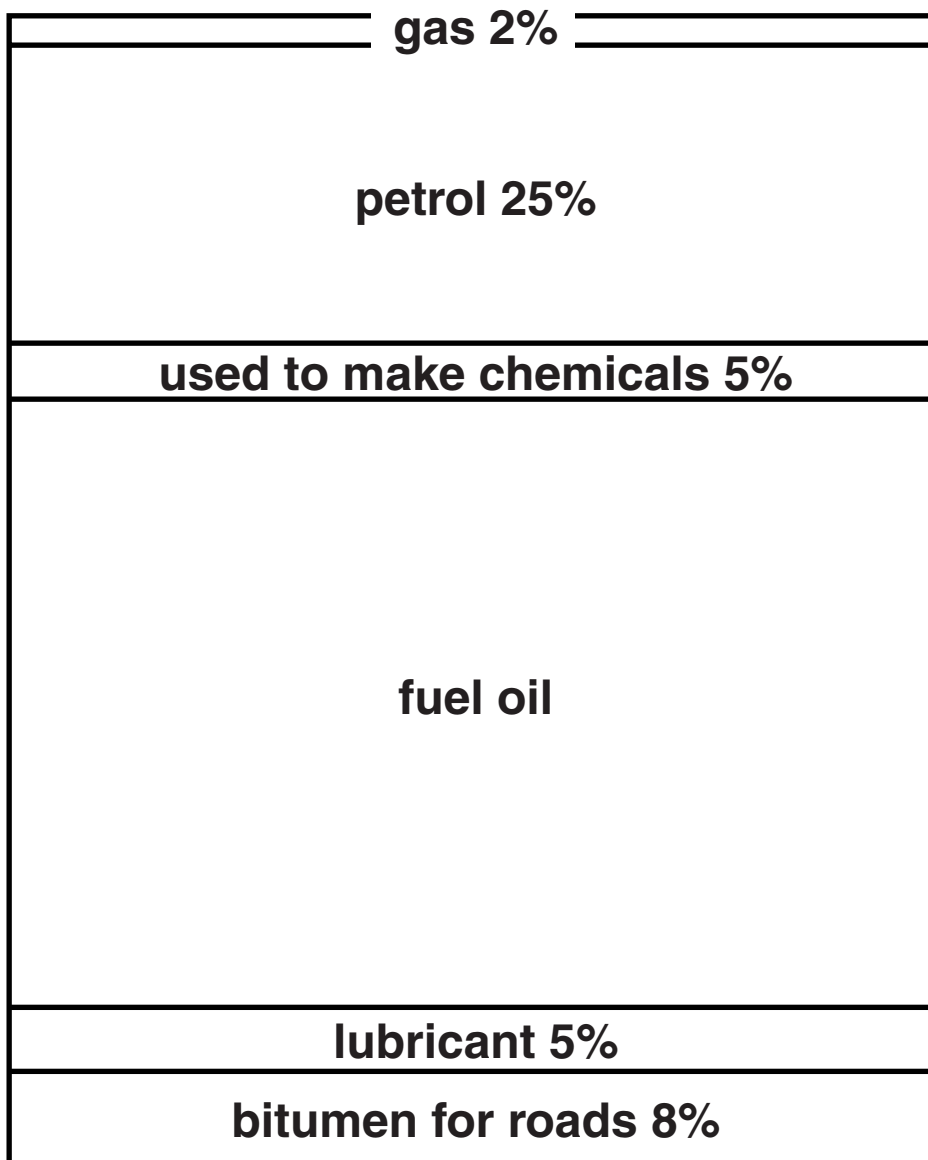
The breaking strength of polythene A is	higher than		the breaking strength of polythene B.
	lower than		
	the same as		

[1]

[Total: 6]

**5 An oil refinery separates crude oil into different fractions.**

**This diagram shows the amount of each fraction made from a barrel of crude oil.**





- (a) (i) Here are some statements about the fractions in crude oil.

Use the diagram to find out if the statements are true or false.

Put a tick (✓) in the correct box for each statement.

	TRUE	FALSE
The smallest fraction of crude oil is gas.		
There is more lubricant than petrol.		
The amount of crude oil used to make chemicals is the same as the amount of lubricant.		

[2]

- (ii) Show that more than half of the crude oil is used as fuel oil.

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[2]

**(b) Complete the sentences to explain why gas boils at a lower temperature than fuel oil.**

**Put a tick (✓) in the box next to the correct words to complete the sentences.**

**Gas molecules are**

<b>smaller than</b>	<input type="checkbox"/>
<b>the same size as</b>	<input type="checkbox"/>
<b>larger than</b>	<input type="checkbox"/>

**molecules of fuel oil.**

**The forces between gas molecules are**

<b>smaller than</b>	<input type="checkbox"/>
<b>the same size as</b>	<input type="checkbox"/>
<b>larger than</b>	<input type="checkbox"/>

**the forces between molecules of fuel oil.**

**The energy needed to overcome the forces between gas molecules is**

<b>less than</b>	<input type="checkbox"/>
<b>the same as</b>	<input type="checkbox"/>
<b>more than</b>	<input type="checkbox"/>

**the energy needed to overcome the forces between molecules of fuel oil.**

**[2]**

**[Total: 6]**



**(b) Give ONE other use of nanoparticles and say how nanoparticles improve the properties.**

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**[2]**

**[Total: 8]**

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**7 Some people are talking about the Government's advice on eating salt.**

**This is what they say.**

**Dr Abbott**

**Salt has been used as a preservative for centuries. My company makes foods that use salt in this way. Sickness from food poisoning is much more common than high blood pressure.**

**Mr Collins**

**Government scientists set a target to eat less than 6 g per day of salt. I eat 0 g per day because I never put salt on my food.**

**Miss Brown**

**A great deal of evidence that eating less salt lowers blood pressure has been published in scientific journals.**

**Mrs Evans**

**I look on packet labels and try to keep my salt intake as low as possible.**

**Professor Derry**

**I went to a conference where scientists showed evidence that a low sodium diet could be harmful to some people.**

- (a) (i) Who is talking about information that has been PEER REVIEWED?**

**Put ticks (✓) in the boxes next to the TWO correct answers.**

**Dr Abbott**

**Miss Brown**

**Mr Collins**

**Professor Derry**

**Mrs Evans**

**[1]**

- (ii) Who is saying that a benefit of salt in food, outweighs a risk from eating too much salt?**

**Put a tick (✓) in the box next to the correct answer.**

**Dr Abbott**

**Miss Brown**

**Mr Collins**

**Professor Derry**

**Mrs Evans**

**[1]**

- (iii) Mr Collins and Mrs Evans have different ways of assessing the amount of salt they eat.**

**Who is correct and why?**

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[2]

- (iv) Companies add salt to foods to preserve them and for one other reason.**

**What is that other reason?**

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[1]



- (b) (i) People with high blood pressure can use potassium chloride as a substitute for salt (sodium chloride).**

**Rocks containing potassium chloride are found deep underground and mined in the same ways as those containing sodium chloride.**

**Companies make potassium chloride using solution mining.**

**Suggest reasons why they might use solution mining rather than digging rocks out of the ground.**

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**[2]**

**(ii) Potassium chloride solution is electrolysed to make different products.**

**It is similar to the electrolysis of sodium chloride.**

**Hydrogen, chlorine and one other product are made.**

**What is the other product?**

**Put a ring around the correct answer.**

**potassium carbonate**

**potassium hydroxide**

**potassium oxide**

**sodium chloride**

**[1]**

**[Total: 8]**

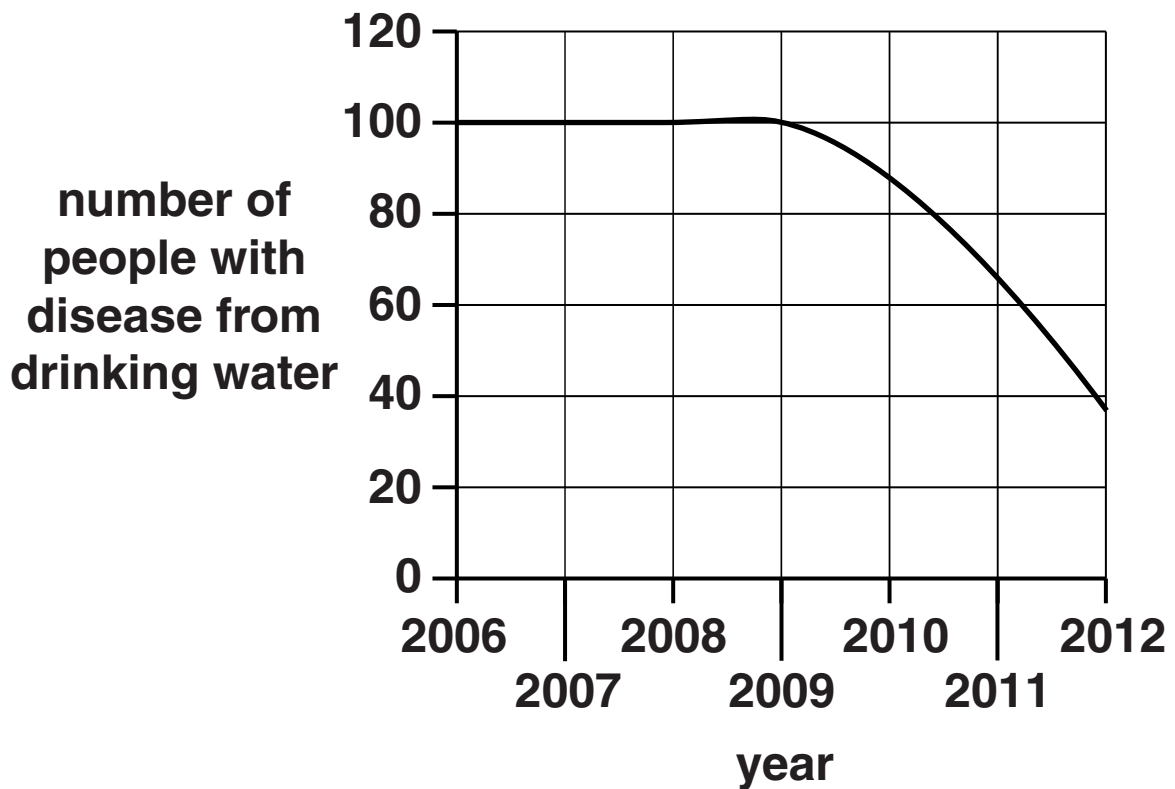
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**8 In remote parts of a developing country, the drinking water causes diseases that kill people.**

**In one area people started to add chlorine to drinking water from 2009.**

**A charity raised the money to pay for this.**

**Look at the graph.**



**Should chlorine be added to drinking water in other remote areas?**



**9 This is a question about poly vinyl chloride (PVC).**

**(a) PVC contains carbon, hydrogen and one other type of atom.**

**What is the other type of atom?**

**Put a ring around the correct answer.**

**chlorine**

**nitrogen**

**sodium**

**sulfur**

**[1]**

**(b) PVC is used to make window frames and bags for blood transfusions.**

**Life Cycle Assessments (LCA) for these two uses are different.**

**Which TWO statements about LCAs explain this difference?**

**Put ticks (✓) in the boxes next to the TWO correct answers.**

**Crude oil is used to make the PVC.**

**Energy is used to make PVC from crude oil.**

**There is an environmental impact when PVC is made from crude oil.**

**There is an environmental impact when each product is made from PVC.**

**The length of time each product is in use.**

**[2]**

**(c) PVC can be disposed of in landfill or recycled.**

**The graph shows the amount of PVC recycled in Europe since the year 2000.**

**(i) The European target was to recycle 200 000 more tonnes of PVC in 2010 than in 2000.**

**Was this target reached?**

**Explain your answer.**

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**[2]**

**(ii) Suggest TWO advantages of recycling MORE PVC.**

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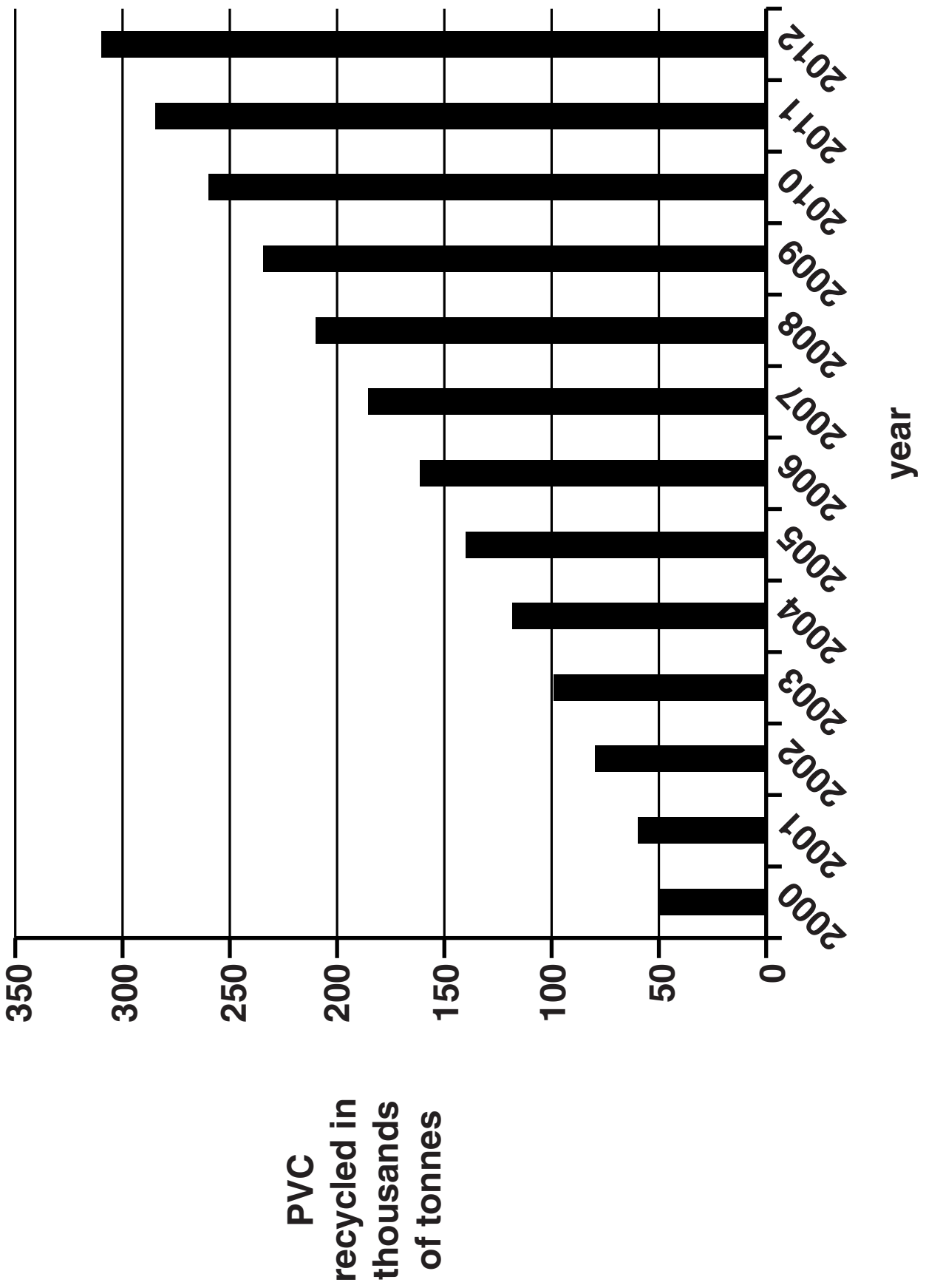
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**[2]**

**[Total: 7]**

**END OF QUESTION PAPER**





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**The Periodic Table of the Elements is provided separately**



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