

Surname					Other Names				
Centre Number					Candidate Number				
Candidate Signature									

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General Certificate of Secondary Education  
June 2003



**SCIENCE: SINGLE AWARD (CO-ORDINATED) 3463/2H  
HIGHER TIER  
Paper 2**

Monday 9 June 2003 9.00 am to 9.45 am

**H**

**In addition to this paper you will require:**  
a ruler;  
the Data Sheet (enclosed).  
You may use a calculator.

Time allowed: 45 minutes

**Instructions**

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

**Information**

- The maximum mark for this paper is 45.
- Mark allocations are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

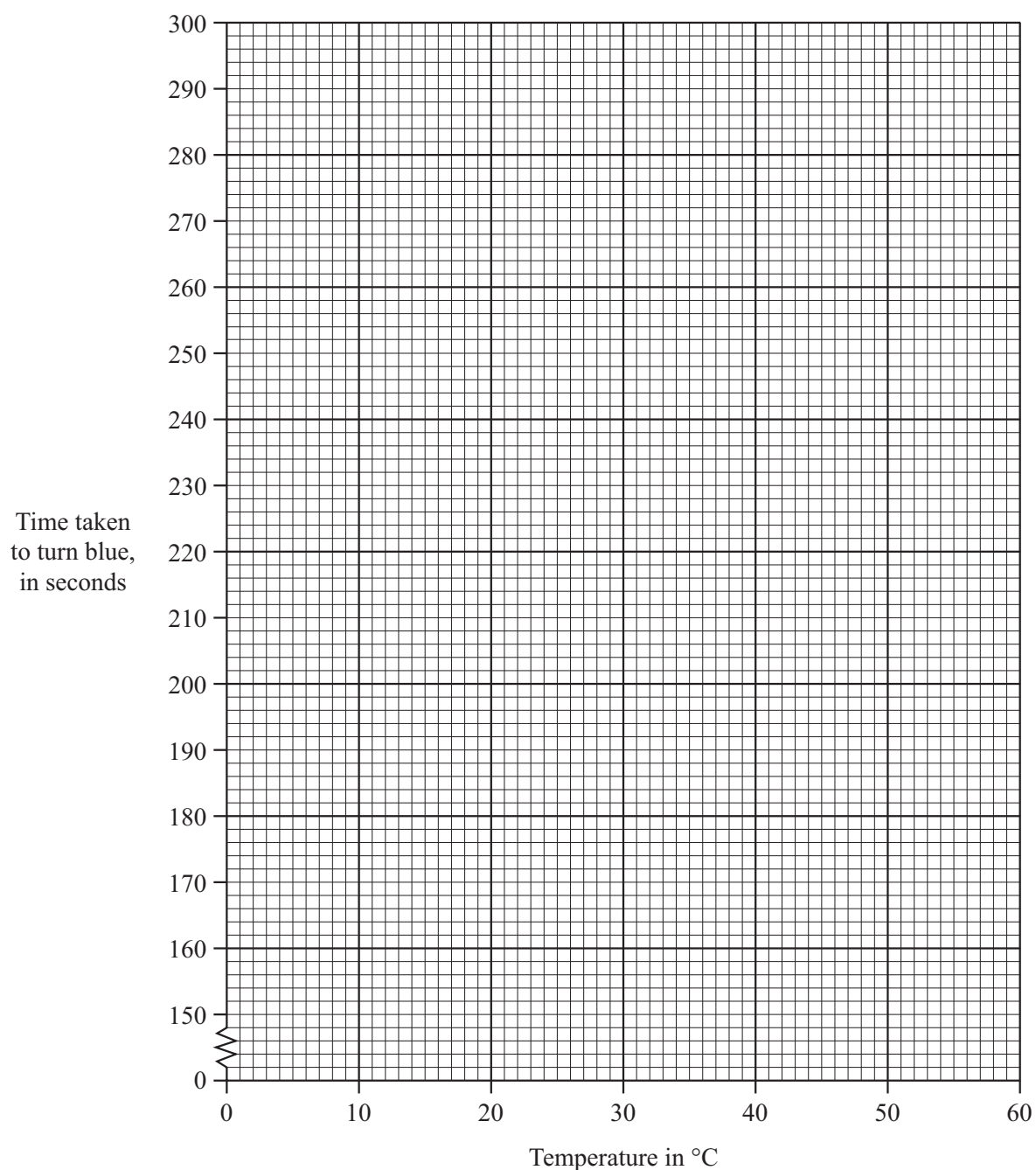
For Examiner's Use			
Number	Mark	Number	Mark
1		4	
2		5	
3		6	
		7	
		8	
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

- 1 Solutions **A** and **B** are colourless. When they are mixed, they react and turn blue after a period of time. A student investigated how temperature affected the rate of reaction between solutions **A** and **B**. The rate was measured by timing how long the mixture took to turn blue.

The results are shown in the table.

<b>Temperature in °C</b>	22	25	34	45	51
<b>Time taken to turn blue, in seconds</b>	290	250	200	170	160

- (a) (i) Draw a graph for these results.



(3 marks)

(ii) Use your graph to find how long it takes the solution to turn blue at 40 °C.

Time = ..... s  
(1 mark)

(b) (i) How does the rate of reaction change as the temperature is increased?

.....  
.....  
(1 mark)

(ii) Explain, in terms of particles, why temperature has this effect on the rate of reaction.

*To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.*

.....  
.....  
.....  
.....  
.....  
.....  
(3 marks)

(c) State **one** variable that must be kept constant to make this experiment a fair test.

.....  
(1 mark)

9

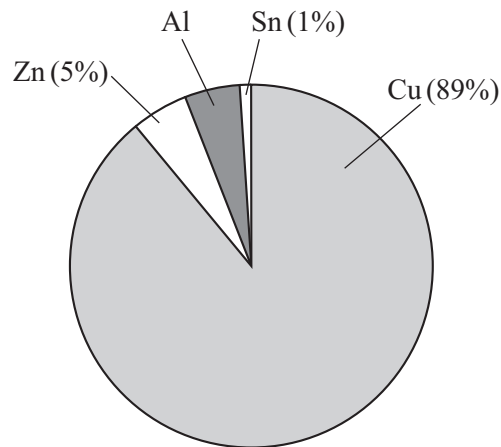
**TURN OVER FOR THE NEXT QUESTION**

**Turn over ▶**

- 2 The 50 Eurocent coin is made from an alloy called 'Nordic Gold'.



The pie chart shows the percentage by mass of each metal in 'Nordic Gold'.



- (a) (i) Calculate the percentage of aluminium, Al, in the coin.

.....  
(1 mark)

- (ii) The 50 Eurocent coin has a mass of 7 grams.  
Calculate the mass of zinc, Zn, in this coin.

.....  
.....

Mass of zinc = ..... g  
(2 marks)

- (b) Zinc is extracted by removing oxygen from zinc oxide.

- (i) What name is given to a reaction in which oxygen is removed from a substance?

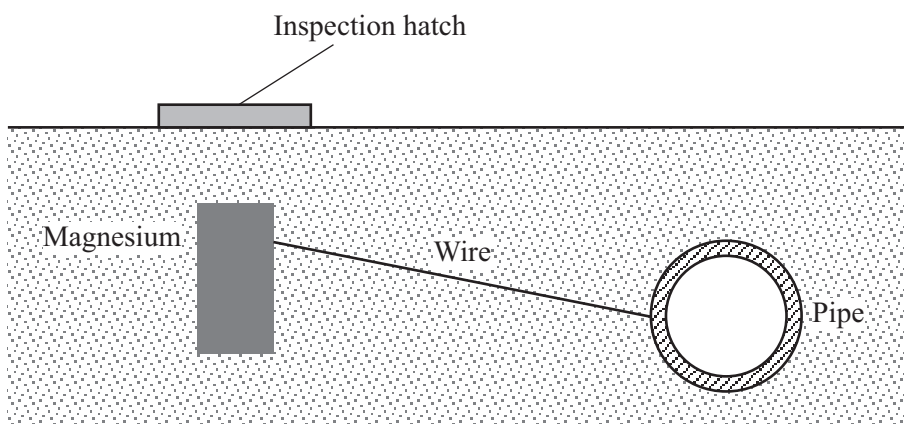
.....  
(1 mark)

- (ii) Explain how oxygen can be removed from zinc oxide to make zinc. Use the reactivity series on the Data Sheet to help you.

.....  
.....  
.....

(2 marks)

- 3 Underground pipes are often made of iron. The diagram shows a method of preventing the pipes from corroding.  
Pieces of magnesium are connected to the pipes at intervals.



- (a) Explain why magnesium can be used to protect pipes from corroding.  
Information on the Data Sheet may help you to answer this question.

.....

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.....

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(2 marks)

- (b) Suggest why this method has to be used to protect underground pipes.

.....

.....

(1 mark)

**TURN OVER FOR THE NEXT QUESTION**


3

- 4 Modern window frames are often made from uPVC which contains the plastic poly(chloroethene).

### WONDERFUL WINDOWS

Replace your old wooden windows  
with our super high quality uPVC  
windows!

NO PAINTING - MAINTENANCE FREE



- (a) State why plastic window frames need no painting or maintenance.

.....  
 .....  
 (1 mark)

- (b) Poly(chloroethene) is a polymer formed by the *addition polymerisation* of chloroethene.

- (i) Chloroethene is an unsaturated molecule. Why is this molecule said to be unsaturated?

.....  
 .....  
 (1 mark)

- (ii) Complete the diagram to represent how poly(chloroethene) is formed from chloroethene.



- (iii) Explain what is meant by the term *polymerisation*.

.....  
 .....  
 .....  
 .....  
 (2 marks)

- (iv) Why is this an *addition polymerisation*?

.....  
 .....  
 (1 mark)

- 5 (a) This hazard symbol was on a cylinder of chlorine gas.

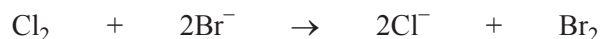


Suggest and explain a suitable safety precaution when using chlorine in the laboratory.

.....  
 .....  
 .....  
 .....

(2 marks)

- (b) Bromine can be extracted from sea water. The bromide ions in the sea water are *oxidised* by chlorine to form bromine.



- (i) Why are the bromide ions said to be *oxidised*?

.....  
 .....

(2 marks)

- (ii) Why is this reaction called a redox reaction?

.....  
 .....

(1 mark)

- (iii) This reaction takes place because chlorine is more reactive than bromine. Explain, in terms of the electron arrangements of the atoms, why chlorine is more reactive than bromine.

.....  
 .....  
 .....  
 .....  
 .....

(3 marks)

6 Neutralisation reactions can be used to make salts.

(a) Write an ionic equation for a neutralisation reaction, including state symbols.

.....  
(2 marks)

(b) Ammonium nitrate is a salt used as a fertiliser.



(i) Ammonium nitrate is made by mixing two solutions. Name these solutions.

..... and .....  
(1 mark)

(ii) Hazard information about ammonium nitrate states:

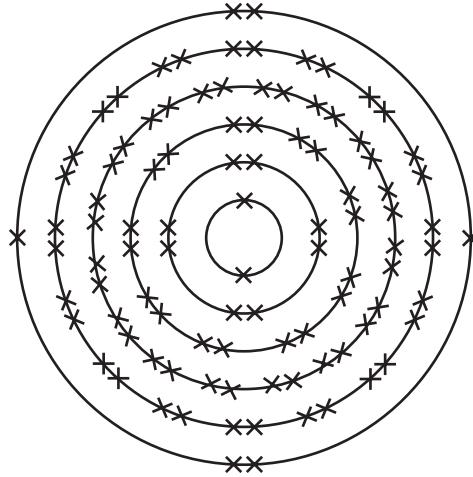
- it is not itself a fire hazard (does not burn);
- it must not be allowed to come into contact with combustible materials such as fuels because it can cause these to catch fire.

Suggest why ammonium nitrate helps other substances to burn.

.....  
.....  
(1 mark)



- 7 In 1999 scientists at the University of Berkeley claimed to have discovered the element Ununhexium. The electron arrangement of this element is thought to be as shown in the diagram below.



- (a) Which group of the periodic table should this element be placed in?

Group .....  
(1 mark)

- (b) Give a reason for your answer.

.....

.....  
(1 mark)

2

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ▶**

- 8 The table shown below was devised by John Newlands in 1864. He arranged the elements in order of their relative atomic masses. He found a repeating pattern, with elements having similar properties in the vertical columns (Groups). He called this pattern the 'Law of Octaves', because elements with similar properties seemed to be repeated every eighth element.

H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe
Co/Ni	Cu	Zn	Y	In	As	Se
Br	Rb	Sr	Ce/La	Zr	Di/Mo	Ro/Ru
Pd	Ag	Cd	U	Sn	Sb	Te
I	Cs	Ba/V	Ta	W	Nb	Au
Pt/Ir	Tl	Pb	Th	Hg	Bi	Os

- (a) Many scientists were critical of Newlands' Law of Octaves. Suggest why other scientists were critical of the Law of Octaves. You should give examples from the table and use your knowledge of the chemistry of the elements.

.....

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(3 marks)

- (b) The diagram below shows a version of Mendeleev's Periodic Table of 1871. Mendeleev placed most of the elements in order of relative atomic mass.

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Period 1	H							
Period 2	Li	Be	B	C	N	O	F	
Period 3	Na	Mg	Al	Si	P	S	Cl	
Period 4	K Cu	Ca Zn	? ?	Ti ?	V As	Cr Se	Mn Br	Fe Co Ni
Period 5	Rb Ag	Sr Cd	Y In	Zr Sn	Nb Sb	Mo Te	? I	Ru Rh Pd

This table became accepted by other scientists.

Give **two** ways in which Mendeleev's table improved on Newlands' table.

1 .....

.....

2 .....

.....

(2 marks)

**END OF QUESTIONS**