Candidate Name	Centre Number	Candidate Number
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WJEC CBAC

GCSE

236/02

SCIENCE
HIGHER TIER
CHEMISTRY 1

P.M. WEDNESDAY, 18 June 2008

45 minutes

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

ADDITIONAL MATERIALS

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

INSTRUCTIONS TO CANDIDATES

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. *(a)* The following table gives information about some elements.
The Periodic Table of Elements is shown on the back page of this examination paper.

Element	*Electronic structure*	*Group number*	*Period in which element is found*
lithium	2,1	1	2
chlorine	.....	7	3
magnesium	2,8,2	.....	.....
.....	2,8,1	1	3

(i) Complete the table above. [4]

(ii) Describe how the electronic structure of an element can be used to work out

I. the group number of the element, [1]

.....

.....

II. the number of the period in which the element is found, [1]

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.....

III. the atomic number of the element. [1]

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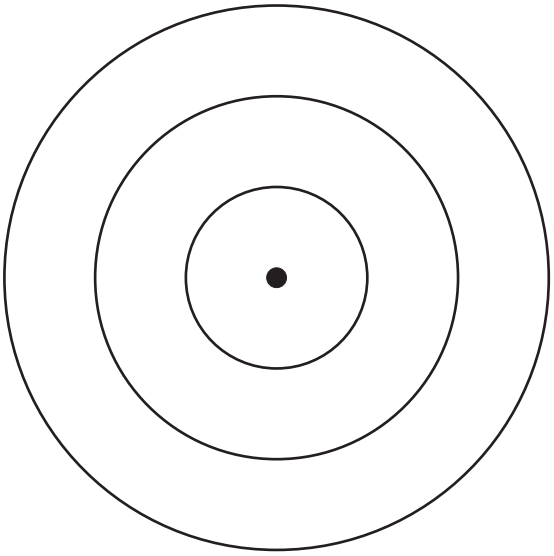
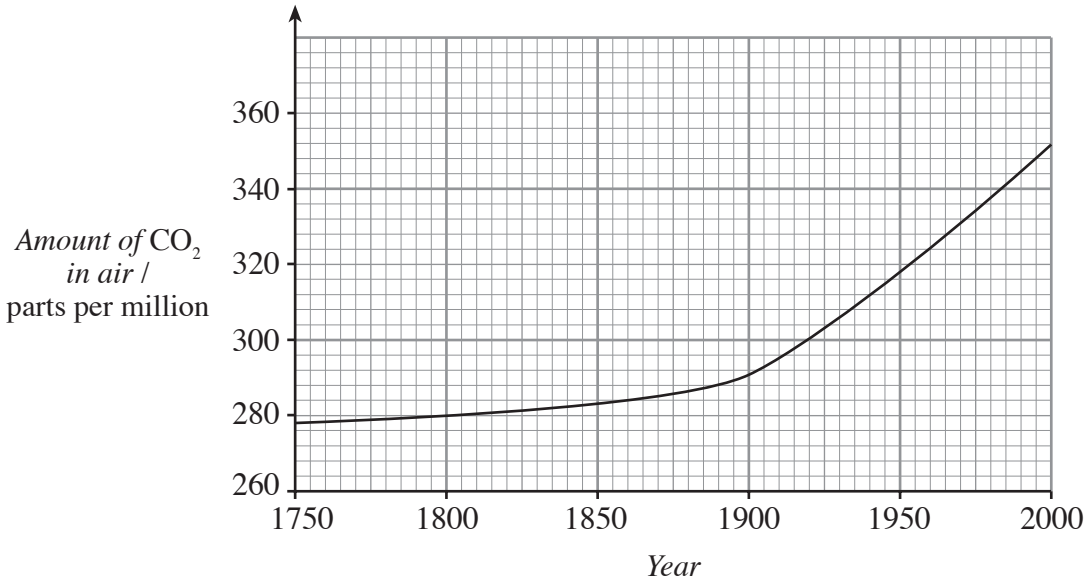
(b) Complete the diagram below to show the electronic configuration of aluminium, atomic number 13. [1]



2. The following graph shows how levels of carbon dioxide in the air have changed between 1750 and the year 2000.



(i) Compare the pattern of change shown in the graph before and after 1900. [2]

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(ii) Give **two** possible reasons for the change seen after 1900. [2]

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(iii) I. Describe what effect these changes in levels of carbon dioxide are believed to be having on the temperature of the Earth's atmosphere. [1]

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II. What is the name given to this effect? [1]

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III. Give **one** possible result of this change in the temperature of the Earth's atmosphere. [1]

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Examiner only

3. The following table gives information about the compounds formed between some metals and non metals. Complete the table. [5]

You may find the table of common ions on the inside of the back cover of this examination paper useful when answering this question.

Compound	*Formula*	*Metal ion present*	*Non metal ion present*
Sodium chloride	NaCl	Na^+	Cl^-
Potassium sulphide	.....	K^+	S^{2-}
Calcium oxide	CaO	.....	.....
.....	.....	Mg^{2+}	Cl^-

5

4. This question is about nanotechnology.

(i) State what is meant by a nanoparticle. [1]

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.....

(ii) Suggest the reason why nano-sized silver particles are used to coat the inner surfaces of refrigerators. [1]

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(iii) State and explain the reason why some people are concerned about the presence of free nanoparticles in the atmosphere. [2]

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4

Turn over.

5. *(a)* Fillers can be used to fill dents in car bodies. These work by mixing a paste with a small quantity of hardener. The paste does not harden until the hardener is added. The hardener acts as a catalyst for the reaction.

State what is meant by a catalyst. [2]

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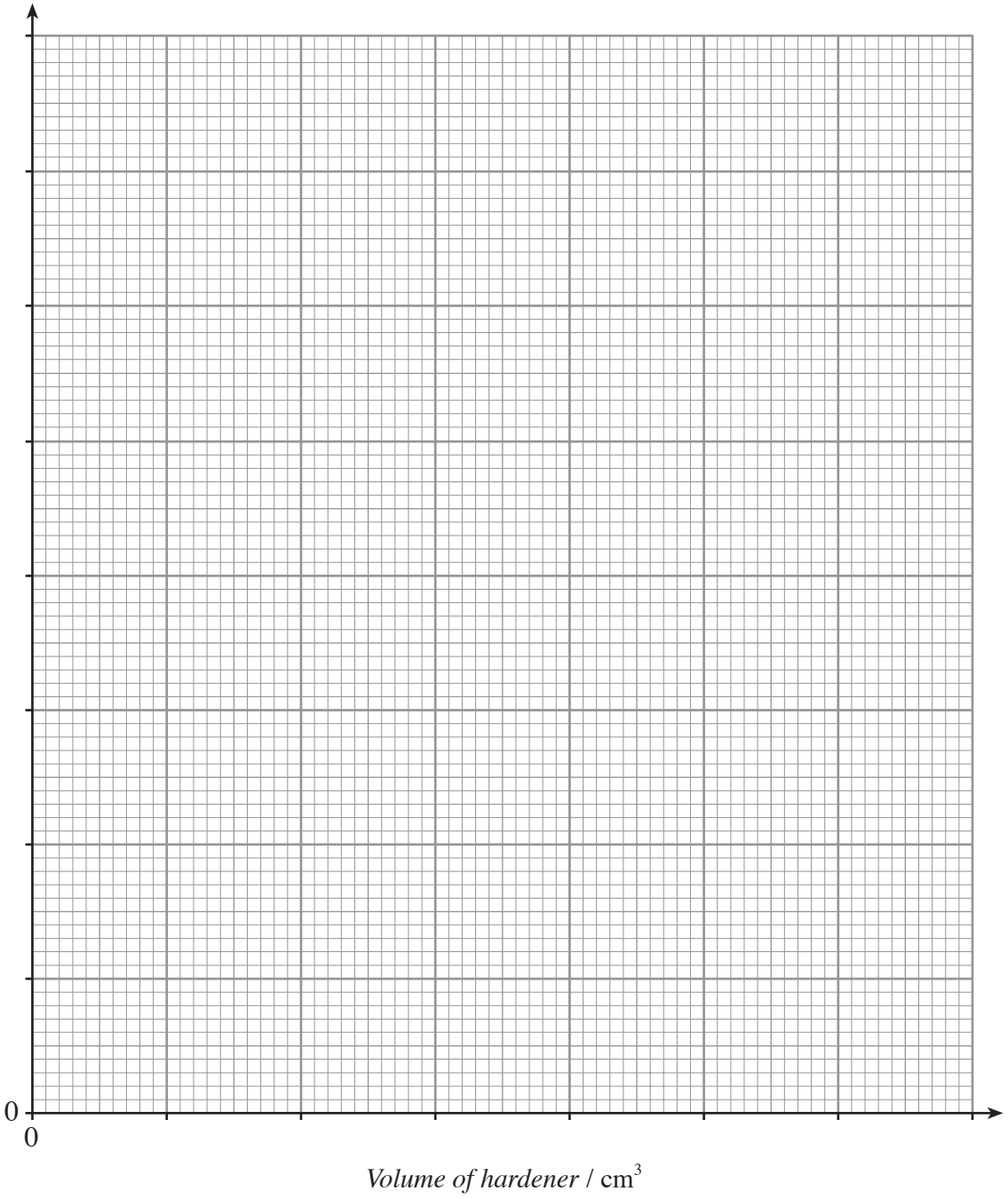
(b) A student wanted to find out if the amount of catalyst made a difference to the rate at which the paste hardened. She mixed a fixed amount of paste with different volumes of catalyst and recorded the time it took for the paste to harden at room temperature, 20 °C. The results obtained are given in the table below.

Volume of hardener added to the paste / cm^3	*Time taken for the paste to harden* / minutes
0.5	15.0
1.0	7.5
1.5	5.0
2.0	3.5
2.5	2.0
3.0	2.0

(i) Draw a graph of the results. [4]



(ii) Using your graph, describe what the results tell you. [2]

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(iii) State what you would expect to happen to the reaction **rate** if the experiment were repeated at 50 °C. [1]

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Turn over.

6. *(a)* Crude oil can be separated into fractions using fractional distillation. The following table shows some properties of the first three fractions collected.

Fraction	*Boiling point range*	*Size of molecules (No. C atoms)*	*Colour of fraction*	*Ease of burning*
A	Up to 80 °C	C1 – C6	colourless	Lights easily and burns with a clean flame
B	80 – 150 °C	C6 – C11	yellow	More difficult to light and produces some smoke
C	Over 150 °C	C11 and above	dark orange	Difficult to ignite and gives smoky flame

Use the table above to help you answer this question.

I. State which fraction, **A**, **B** or **C**, would be **most** useful as a fuel, giving a reason for your answer. [1]

Fraction .....

Reason .....

.....

II. Explain how the crude oil is separated into different fractions. [3]

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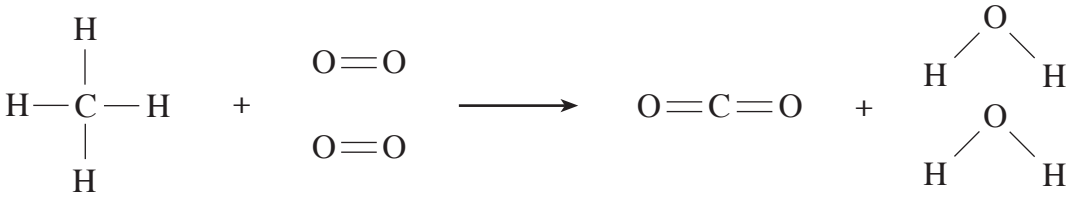
(b) Methane (natural gas) is also found in crude oil. When it burns in air, the following reaction takes place:

$$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$$



The relative amounts of energy needed to break the bonds in the above reaction are shown in the table below.

Bond	*Amount of energy needed to break the bond* / kJ
C — H	413
O = O	498
C = O	805
H — O	464

The amount of energy released in making a bond is equal and opposite to that needed to break the bond.

(i) Use the bond energy values in the table to calculate the relative energy

I. needed to break all the bonds in the reactants, [2]

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.....

II. released when the bonds in the products are formed. [2]

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(ii) Calculate the overall energy change for the reaction. Use your answer to state and explain whether the reaction is exothermic or endothermic. [2]

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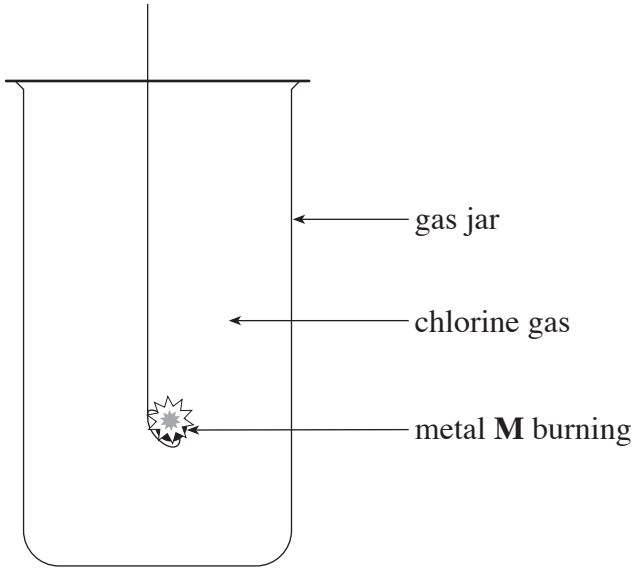
7. The reaction between Group 1 metals and chlorine can be carried out using the following apparatus.



(i) When metal **M** (**M** is not the chemical symbol for the metal) reacts with chlorine, a white solid chloride, **M**Cl, is produced.
When a flame test is carried out on this solid, a yellow-orange flame is seen. Use this information to identify metal **M**. [1]

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(ii) Give a balanced **symbol** equation for the reaction taking place, using **M** as the symbol for the metal. [3]

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(iii) Describe a test to distinguish between a solution containing chloride ions and a solution containing iodide ions. Include the observations for both solutions in your answer. [3]

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FORMULAE FOR SOME COMMON IONS

POSITIVE IONS		NEGATIVE IONS	
Name	**Formula**	**Name**	**Formula**
Aluminium	Al^{3+}	Bromide	Br^{-}
Ammonium	NH_4^{+}	Carbonate	CO_3^{2-}
Barium	Ba^{2+}	Chloride	Cl^{-}
Calcium	Ca^{2+}	Fluoride	F^{-}
Copper(II)	Cu^{2+}	Hydroxide	OH^{-}
Hydrogen	H^{+}	Iodide	I^{-}
Iron(II)	Fe^{2+}	Nitrate	NO_3^{-}
Iron(III)	Fe^{3+}	Oxide	O^{2-}
Lithium	Li^{+}	Sulphate	SO_4^{2-}
Magnesium	Mg^{2+}		
Nickel	Ni^{2+}		
Potassium	K^{+}		
Silver	Ag^{+}		
Sodium	Na^{+}		

Turn over.

(236-01)

PERIODIC TABLE OF ELEMENTS

1	2	Group										3	4	5	6	7	0
								$^{1}_{1}$H Hydrogen									$^{4}_{2}$He Helium
$^{7}_{3}$Li Lithium	$^{9}_{4}$Be Beryllium											$^{11}_{5}$B Boron	$^{12}_{6}$C Carbon	$^{14}_{7}$N Nitrogen	$^{16}_{8}$O Oxygen	$^{19}_{9}$F Fluorine	$^{20}_{10}$Ne Neon
$^{23}_{11}$Na Sodium	$^{24}_{12}$Mg Magnesium											$^{27}_{13}$Al Aluminium	$^{28}_{14}$Si Silicon	$^{31}_{15}$P Phosphorus	$^{32}_{16}$S Sulphur	$^{35}_{17}$Cl Chlorine	$^{40}_{18}$Ar Argon
$^{39}_{19}$K Potassium	$^{40}_{20}$Ca Calcium	$^{45}_{21}$Sc Scandium	$^{48}_{22}$Ti Titanium	$^{51}_{23}$V Vanadium	$^{52}_{24}$Cr Chromium	$^{55}_{25}$Mn Manganese	$^{56}_{26}$Fe Iron	$^{59}_{27}$Co Cobalt	$^{59}_{28}$Ni Nickel	$^{64}_{29}$Cu Copper	$^{65}_{30}$Zn Zinc	$^{70}_{31}$Ga Gallium	$^{73}_{32}$Ge Germanium	$^{75}_{33}$As Arsenic	$^{79}_{34}$Se Selenium	$^{80}_{35}$Br Bromine	$^{84}_{36}$Kr Krypton
$^{86}_{37}$Rb Rubidium	$^{88}_{38}$Sr Strontium	$^{89}_{39}$Y Yttrium	$^{91}_{40}$Zr Zirconium	$^{93}_{41}$Nb Niobium	$^{96}_{42}$Mo Molybdenum	$^{99}_{43}$Tc Technetium	$^{101}_{44}$Ru Ruthenium	$^{103}_{45}$Rh Rhodium	$^{106}_{46}$Pd Palladium	$^{108}_{47}$Ag Silver	$^{112}_{48}$Cd Cadmium	$^{115}_{49}$In Indium	$^{119}_{50}$Sn Tin	$^{122}_{51}$Sb Antimony	$^{128}_{52}$Te Tellurium	$^{127}_{53}$I Iodine	$^{131}_{54}$Xe Xenon
$^{133}_{55}$Cs Caesium	$^{137}_{56}$Ba Barium	$^{139}_{57}$La Lanthanum	$^{179}_{72}$Hf Hafnium	$^{181}_{73}$Ta Tantalum	$^{184}_{74}$W Tungsten	$^{186}_{75}$Re Rhenium	$^{190}_{76}$Os Osmium	$^{192}_{77}$Ir Iridium	$^{195}_{78}$Pt Platinum	$^{197}_{79}$Au Gold	$^{201}_{80}$Hg Mercury	$^{204}_{81}$Tl Thallium	$^{207}_{82}$Pb Lead	$^{209}_{83}$Bi Bismuth	$^{210}_{84}$Po Polonium	$^{210}_{85}$At Astatine	$^{222}_{86}$Rn Radon
$^{223}_{87}$Fr Francium	$^{226}_{88}$Ra Radium	$^{227}_{89}$Ac Actinium															

Key: