Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4462/01

SCIENCE A/CHEMISTRY

CHEMISTRY 1
FOUNDATION TIER

A.M. THURSDAY, 13 June 2013

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**5**	
2.	**6**	
3.	**5**	
4.	**8**	
5.	**3**	
6.	**9**	
7.	**9**	
8.	**6**	
9.	**3**	
10.	**6**	
Total	**60**	

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ADDITIONAL MATERIALS

In addition to this paper you will need a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.
Do not use gel pen or correction fluid.

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. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

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

You are reminded that assessment will take into account the quality of written communication used in your answer to question **10**.

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.

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Answer **all** *questions.*

1. The following box shows the names of five non-metals.

argon	**chlorine**	**helium**	**iodine**	**neon**

Use **only** the non-metals named above to complete sentences *(a)*-*(c)*.

Each non-metal can be used once, more than once or not at all.

(a) A gas used to fill weather balloons is ..... . [1]

(b) Two non-metals that can be obtained from sea water are

..... and ..... . [2]

(c) ..... and ..... are poisonous and can be used to kill bacteria. [2]

5

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2. *(a)* The table below shows information about four ionic compounds. Complete the table. [3]

Compound	Formula	Elements present
aluminium oxide	Al_2O_3	aluminium and oxygen
calcium chloride	$CaCl_2$	..... and .....
.....	CuO	copper and oxygen
magnesium bromide	.....	magnesium and bromine

(b) The following diagram represents carbon dioxide, CO_2.

(i) Use the diagram to complete the key. [1]

hydrogen 

carbon .....

chlorine 

oxygen .....

(ii) Using the key, draw a diagram that represents a molecule of

I. water, H_2O [1]

II. tetrachloromethane, CCl_4 [1]

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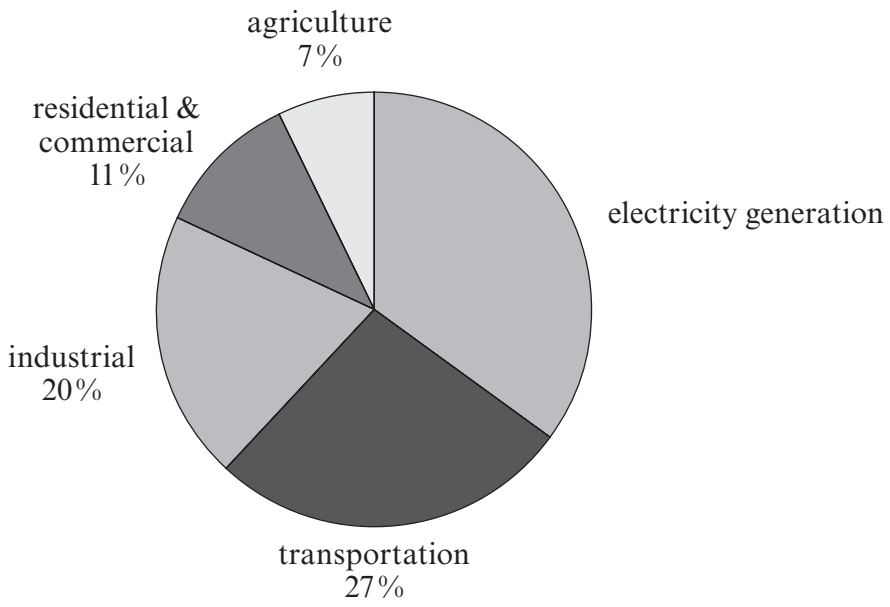
3. The following pie chart shows the sources of greenhouse gas emissions in the United States.



(a) Calculate the percentage of emissions from electricity generation. [2]

Percentage of emissions from electricity generation = ... %

(b) Explain why scientists are concerned about the release of greenhouse gases such as carbon dioxide into the atmosphere. [2]

.....

.....

.....

(c) Suggest **one** way to reduce the amount of greenhouse gases released into the atmosphere due to electricity generation. [1]

.....

5

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4. A student was investigating the reactivity of copper, magnesium and zinc. He placed each metal into the solutions shown in the table and recorded his observations.

Metal	Solution	Observations
magnesium	copper sulfate	a brown solid forms and the solution turns from blue to colourless
zinc	copper sulfate	a brown solid forms and the solution turns from blue to colourless
magnesium	zinc sulfate	the magnesium ribbon turns dark grey
copper	zinc sulfate	no reaction

(a) Use the information in the table to place the metals in order of reactivity. [1]

Most reactive .....

.....

Least reactive .....

(b) Name the products formed in the reaction between magnesium and copper sulfate solution. [2]

..... and .....

(c) Give the chemical formula for zinc sulfate. ..... [1]

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(d) Lead can be extracted from its oxide using carbon in a furnace.

(i) Balance the following symbol equation for the reaction taking place. [1]

$$\square\ PbO + C \longrightarrow \square\ Pb + CO_2$$

(ii) Oxidation and reduction both take place in the above reaction. Name the substance being oxidised and give a reason for your choice. [2]

Substance being oxidised .....

Reason .....

.....

(iii) State why heating with carbon cannot be used to extract aluminium from its ore. [1]

.....

.....

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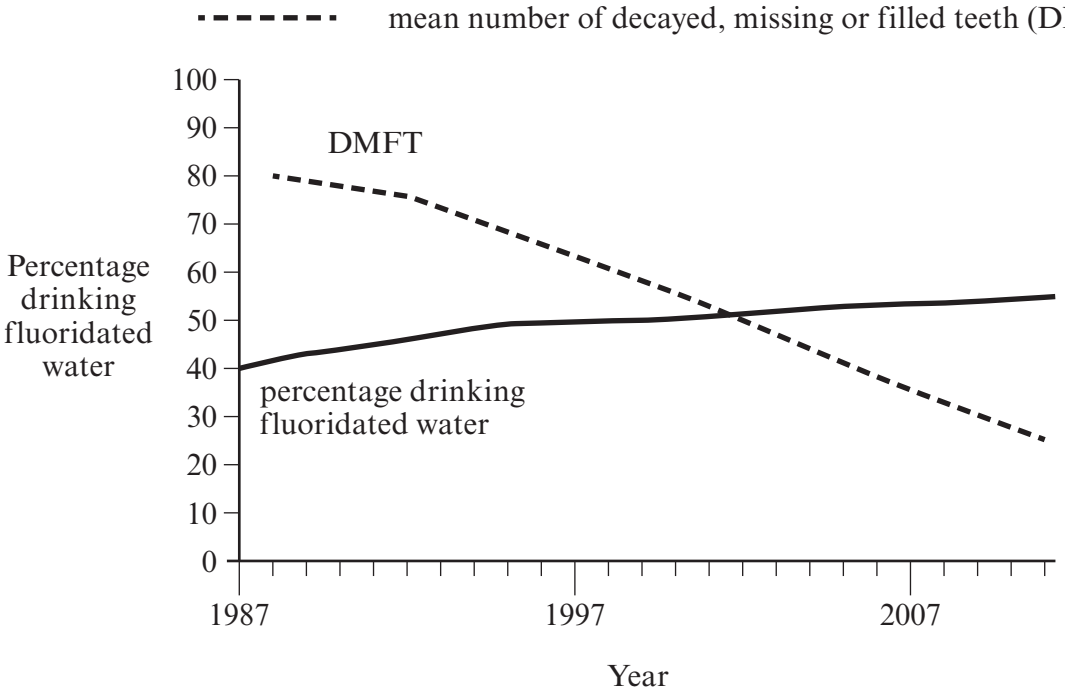
Examiner only

5. A water company is planning to add fluoride to drinking water. The following graph was used to support their plan. It shows how the number of decayed, missing or filled teeth is affected by the presence of fluoride in drinking water.



(a) State how the data in the graph can be used to persuade people that adding fluoride to drinking water is a good idea. [1]

.....

.....

(b) Discuss why some people are against the fluoridation of water supplies. [2]

.....

.....

.....

3

Examiner only

6. Plastics such as polythene and polystyrene are widely used in everyday life.

(a) The table below shows the properties and some common uses of polythene and polystyrene.

Plastic	Properties	Uses
polythene	flexible, low density, waterproof, non-toxic, unreactive	carrier bags, bin liners, plastic bottles
polystyrene	rigid, low density, non-toxic, easily squashed, good insulator, unreactive	yoghurt pots, disposable cups, egg cartons, protective packaging

Use the information in the table to give a reason why

(i) polythene is used to make carrier bags and bin liners, [1]

.....

(ii) polystyrene is used for disposable cups. [1]

.....

(b) State why the use of plastics causes environmental problems and give **one** way of overcoming these problems. [3]

.....

.....

.....

.....

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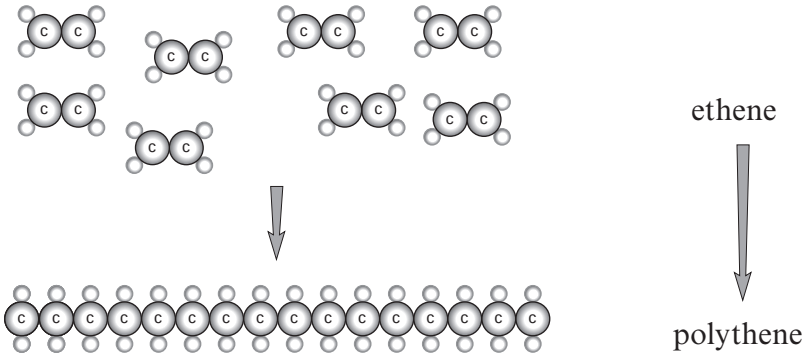
(c) Polythene can be made from ethene as shown in the following diagram.



Use some of the terms given in the box below to complete the sentences that follow.

cracking	**electrolysis**	**monomer**	**polymer**
polymerisation	**reactive**	**unreactive**	

Ethene is a small ..... molecule known as a .....

Many of these molecules join together in a process called .....

to produce a long chain molecule known as a ..... [4]

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Turn over.

Examiner only

7. The table below shows some information about elements **A-F**. The letters are not the chemical symbols of the elements.

Element	Colour	Melting point (°C)	Boiling point (°C)	Conducts electricity	Density (g/cm^3)
A	dull grey	1414	2900	yes	2.03
B	pale yellow	–219	–188	no	0.0017
C	orange brown	–7	59	no	3.10
D	shiny brown	1084	2927	yes	8.92
E	shiny grey	1538	2861	yes	7.87
F	colourless	–157	–153	no	0.0033

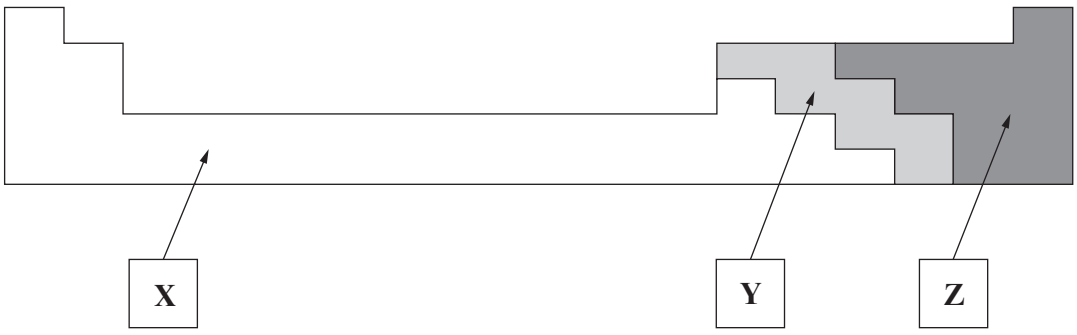
(a) State which of the elements **A-F** are gases at room temperature. [1]

.....

(b) Give the letter of the element **A-F** that has the biggest difference between melting point and boiling point. [1]

.....

(c) The following diagram shows an outline of the Periodic Table.



(i) Element **A** is found in area **Y** of the Periodic Table. Explain how the information in the table supports this. [2]

.....

.....

(ii) From elements **B-F**, identify **all** that would be found in area **X**. [1]

.....

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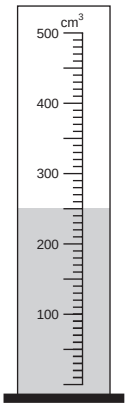
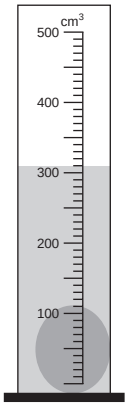
(d) A student has a sample of element **D** of mass 540 g. She measures its volume using a measuring cylinder as shown below.



Measuring cylinder before adding sample of element **D**



Measuring cylinder after adding sample of element **D**

(i) Using the information given above and the equation below, calculate the density of the sample of element **D**. [2]

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

Density of sample of element **D** = ... g/cm^3

(ii) Another pupil obtained a value of 9.10 g/cm^3. Suggest why this value is different to that given in the table. [2]

.....

.....

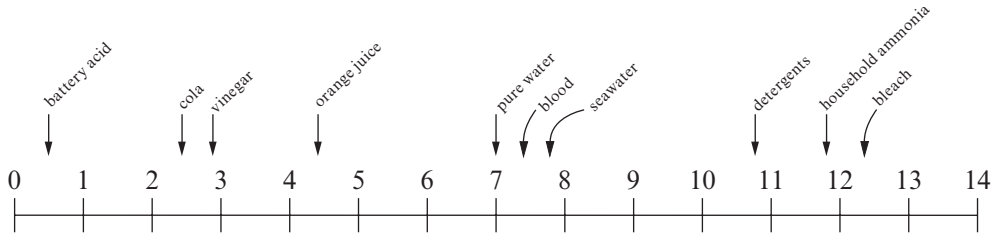
.....

9

Turn over.

Examiner only

8. The following diagram shows the pH scale and the pH values of some common substances.



(a) From the substances above, name

(i) the strongest acid, ... [1]

(ii) the weakest alkali, ... [1]

(iii) a neutral substance. ..... [1]

(b) John was studying the reactions of acids with three different substances, **A**, **B** and **C**. He recorded his observations and temperature changes in the table shown below.

Substance added to acid	Observations	Temperature change (°C)
A	bubbles of gas produced, gas collected turns limewater milky, substance reacts to produce blue solution	+4
B	no gas produced, substance reacts to produce a blue solution	0
C	no visible change	+8

Identify **A**, **B** and **C** from the substances in the box below. [3]

copper carbonate	**copper oxide**	**magnesium**
sodium chloride	**sodium hydroxide**	

A .....

B .....

C .....

6

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9. Nano-silver particles can be used in socks, plasters and disinfectant sprays.

Explain why nano-silver is suitable for use in these examples and state why some people are concerned about the use of nanoparticles in everyday life. [3]

.....

.....

.....

.....

3

Turn over.

Examiner only

10. Copper and titanium are important metals. The following table shows some of their uses.

Metal	Uses
copper	electrical wiring, water pipes, saucepan bases, jewellery
titanium	hip replacements, rotors on helicopters, pipes in chemical industry

Describe how the properties of copper and titanium make them suitable for these uses.

[6 QWC]

END OF PAPER

6

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Question number	**Additional page, if required. Write the question numbers in the left-hand margin.**

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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^{+}	Sulfate	SO_4^{2-}
Magnesium	Mg^{2+}		
Nickel	Ni^{2+}		
Potassium	K^{+}		
Silver	Ag^{+}		
Sodium	Na^{+}		
Zinc	Zn^{2+}		

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 Sulfur	$^{35}_{17}$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: