

Please check the examination details below before entering your candidate information

Candidate surname				Other names			
Centre Number				Candidate Number			
<b>Pearson Edexcel</b> <b>Level 1/Level 2 GCSE (9–1)</b>				<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>			
<b>Wednesday 12 June 2019</b>							
Morning (Time: 1 hour 10 minutes)				Paper Reference <b>1SC0/2CF</b>			
<b>Combined Science</b> <b>Paper 5: Chemistry 2</b>							
<b>Foundation Tier</b>							
<b>You must have:</b> Calculator, ruler						Total Marks	

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

### Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- In questions marked with an **asterisk (\*)**, marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.
- A periodic table is printed on the back cover of this paper.

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross in a box . If you change your mind about an answer, put a line through the box  and then mark your new answer with a cross .

- 1 (a) Plants release oxygen into the atmosphere.

What is the name of the process that releases oxygen into the atmosphere?

(1)

- A combustion  
 B oxidation  
 C photosynthesis  
 D polymerisation

- (b) The atmosphere contains 21% of oxygen.

- (i) Figure 1 shows an incomplete bar chart of the main gases in the atmosphere.

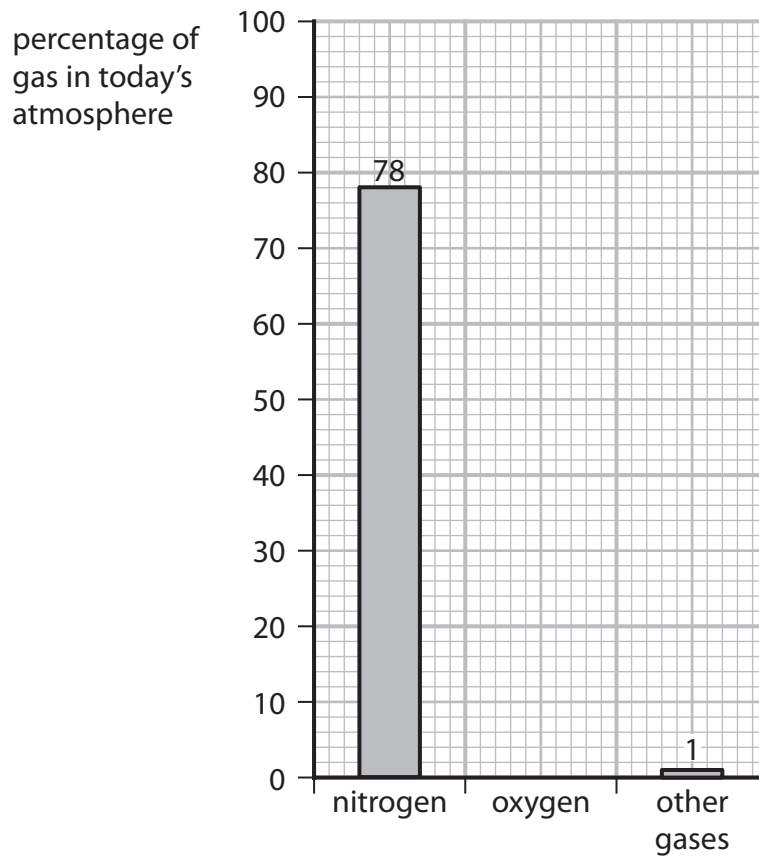


Figure 1

Complete the bar chart by showing the percentage of oxygen in the atmosphere.

(1)



(ii) Calculate the volume of oxygen present in  $300\text{ cm}^3$  of air.

(volumes are measured under the same conditions of temperature and pressure)

(2)

volume of oxygen = .....  $\text{cm}^3$

(c) An atom of an element has an atomic number and a mass number.

Draw one straight line from each of these to the numbers of subatomic particles it shows to be present in an atom.

(2)

**number of subatomic particles in an atom**

atomic number	● number of protons
mass number	● number of neutrons
	● total number of protons and electrons
	● total number of protons and neutrons
	● total number of protons, neutrons and electrons

(d) Which test shows a gas is oxygen?

(1)

- A** a few drops of limewater will turn cloudy when shaken with the gas
- B** a glowing splint will relight when placed in the gas
- C** a lighted splint placed in the gas will cause a pop
- D** a piece of damp red litmus paper will turn blue when placed in the gas

**(Total for Question 1 = 7 marks)**



P 6 0 2 4 6 A 0 3 2 0

2 (a) Complete the following sentences.

(i) The name given to group 7 in the periodic table is ..... (1)

(ii) The name given to group 0 in the periodic table is ..... (1)

(b) Which of the following rows gives the colours of the group 7 elements chlorine and bromine at room temperature? (1)

	chlorine	bromine
<input type="checkbox"/> A	red-brown	purple
<input type="checkbox"/> B	yellow-green	grey
<input type="checkbox"/> C	yellow-green	red-brown
<input type="checkbox"/> D	grey	red-brown

(c) Figure 2 shows the melting and boiling points of bromine and iodine.

element	melting point in °C	boiling point in °C
bromine	-7	59
iodine	114	184

Figure 2

Using the information in Figure 2, which row shows the physical states of these elements at 50 °C? (1)

	bromine	iodine
<input type="checkbox"/> A	liquid	gas
<input type="checkbox"/> B	solid	liquid
<input type="checkbox"/> C	gas	solid
<input type="checkbox"/> D	liquid	solid



(d) The densities of some elements in group 0 are shown in Figure 3.

name	density in $\text{g cm}^{-3}$
helium	0.15
neon	1.2
argon	1.4
krypton	
xenon	3.5

**Figure 3**

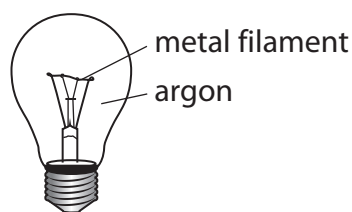
Use the information in Figure 3 to suggest the density of krypton.

(1)

density of krypton = .....  $\text{g cm}^{-3}$

(e) For many years, argon was used to fill filament light bulbs.

A filament light bulb is shown in Figure 4.



**Figure 4**

When the bulb is in use the metal filament becomes extremely hot.

Explain why argon, rather than air, was used to fill filament light bulbs.

(2)

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**(Total for Question 2 = 7 marks)**



- 3 A student poured  $50\text{ cm}^3$  water into a beaker and measured the water's temperature.

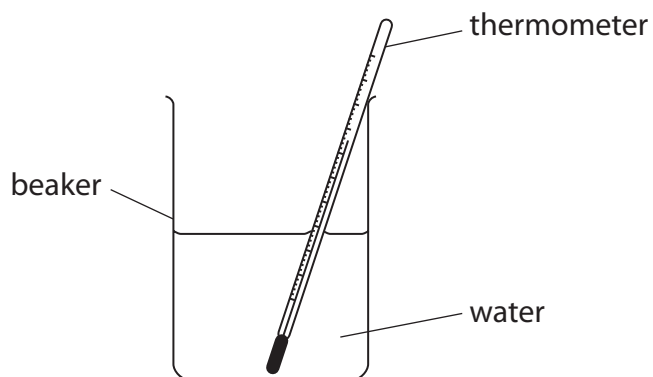


Figure 5

The student added  $1.00\text{ g}$  calcium chloride to the water, stirred the mixture and then recorded the temperature.

- (a) Give the name of the apparatus that could be used to measure  $1.00\text{ g}$  of calcium chloride.

(1)

- (b) The student's results were

temperature of water at start	= $21\text{ }^\circ\text{C}$
temperature of mixture after stirring	= $32\text{ }^\circ\text{C}$

Explain, using these results, the type of heat energy change that occurs when calcium chloride dissolves in water.

(2)

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(c) Calcium chloride is hazardous to health.

(i) Which hazard symbol would be expected to be seen on a container of calcium chloride?

(1)

A



B



C



D



(ii) Give a safety precaution that the student should take during the experiment.

(1)

.....

.....

(d) State **one** way in which the apparatus could be changed to reduce the amount of heat energy lost during the experiment.

(1)

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.....



P 6 0 2 4 6 A 0 7 2 0

(e) The concentration of a calcium chloride solution is  $12 \text{ g dm}^{-3}$ .

Calculate the volume of this solution, in  $\text{cm}^3$ , that contains 9.0 g of calcium chloride.

You must show your working.

(3)

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volume of solution = .....  $\text{cm}^3$

**(Total for Question 3 = 9 marks)**

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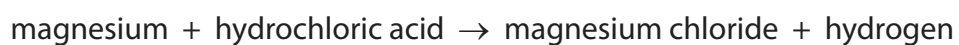
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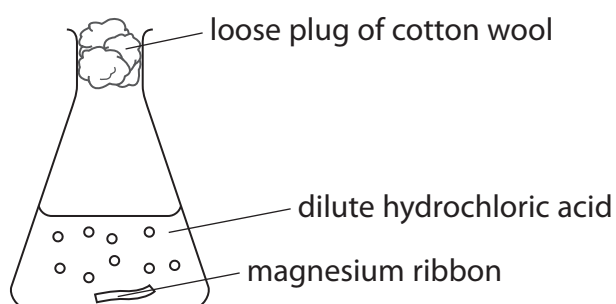
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4 The word equation for the reaction between magnesium and dilute hydrochloric acid is



The reaction was carried out using the apparatus shown in Figure 6.

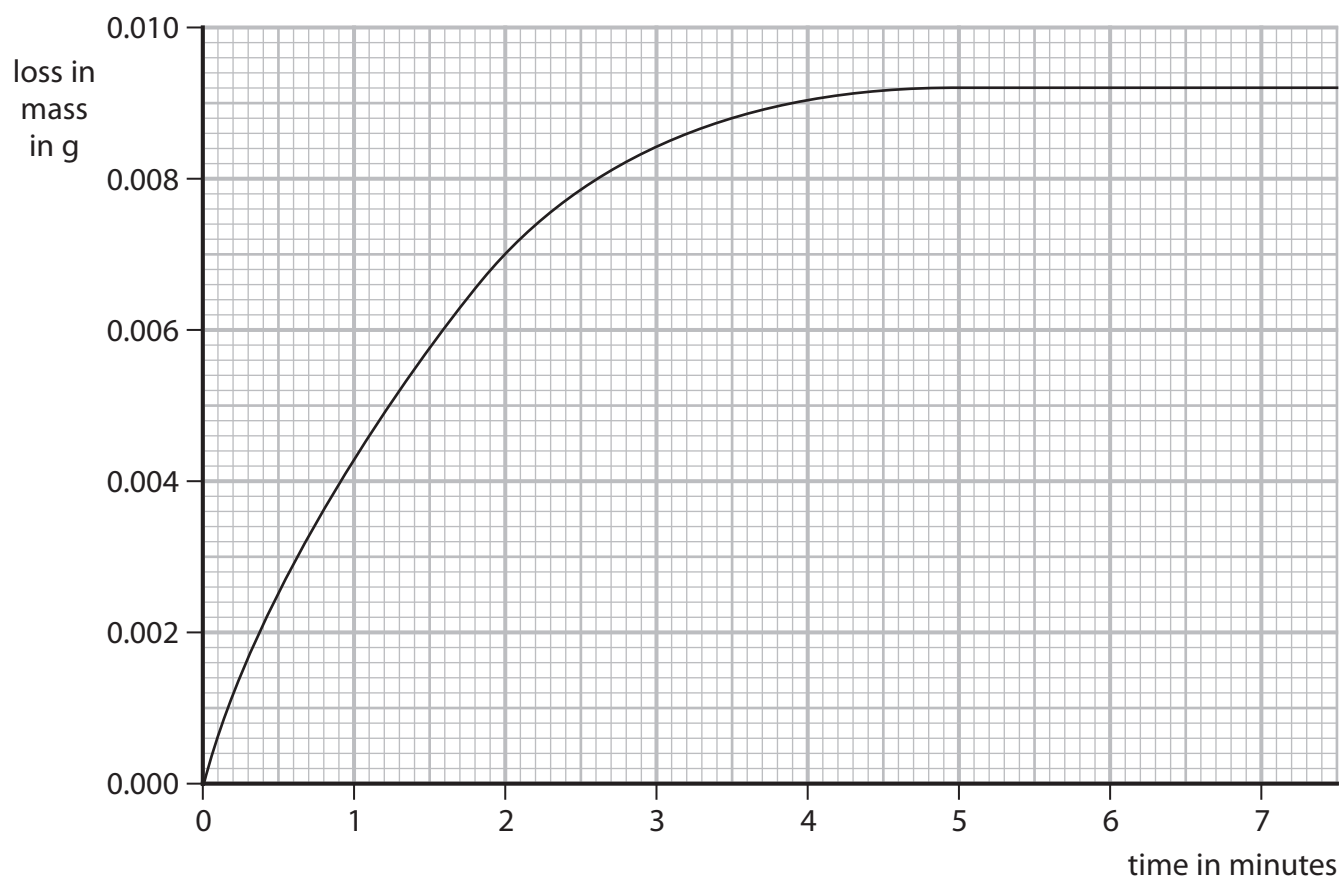


**Figure 6**

A strip of magnesium ribbon was placed in the conical flask.  
 $100\text{ cm}^3$  of dilute hydrochloric acid was added to the conical flask.

The mass of the flask and contents was measured at regular intervals.  
 The loss in mass was calculated.

Figure 7 shows a graph of the results.



**Figure 7**



(a) Name the apparatus that could be used to measure out  $100\text{ cm}^3$  of dilute hydrochloric acid. (1)

(b) Explain why there is a loss in mass of the flask and contents. (2)

(c) The graph shows that the rate of reaction slows as the reaction takes place.  
Explain, in terms of particles, why the rate of reaction between magnesium ribbon and dilute hydrochloric acid slows as the reaction takes place. (3)

(d) The experiment was repeated using the acid at a higher temperature.  
All other conditions were kept the same.  
State the effect of the higher temperature on the mass loss after two minutes. (1)

(e) The original experiment was repeated using the same mass of magnesium powder instead of the magnesium ribbon.  
All other conditions were kept the same.  
Sketch, on the graph in Figure 7, the line you would expect for this experiment. (2)



(f) Some reactions are affected by the presence of a catalyst.

(i) State the effect of a catalyst on a reaction.

(1)

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(ii) Devise a simple experiment to find out what happens to the mass of a solid catalyst during a reaction.

(3)

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**(Total for Question 4 = 13 marks)**

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5 Most of the fuels used today are obtained from crude oil.

(a) Which statement about crude oil is correct? (1)

- A** crude oil is a compound of different hydrocarbons
- B** crude oil is a mixture of hydrocarbons
- C** crude oil contains different hydrocarbons, all with the same molecular formula
- D** crude oil is an unlimited supply of hydrocarbons

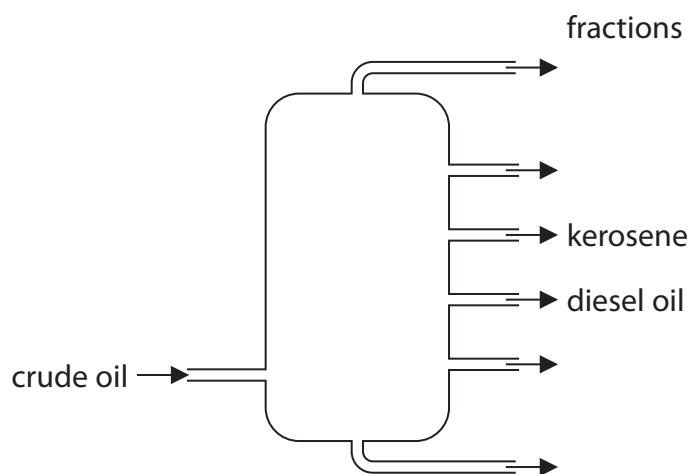
(b) Crude oil is separated into several fractions by fractional distillation. Two of these fractions are kerosene and diesel oil.

(i) State a use for each of these fractions. (2)

kerosene.....

diesel oil.....

(ii) Figure 8 shows where the fractions kerosene and diesel oil are produced in the fractionating column.



**Figure 8**

Kerosene is obtained higher up the column than diesel oil.  
Kerosene and diesel oil fractions have slightly different properties.

Choose a property.

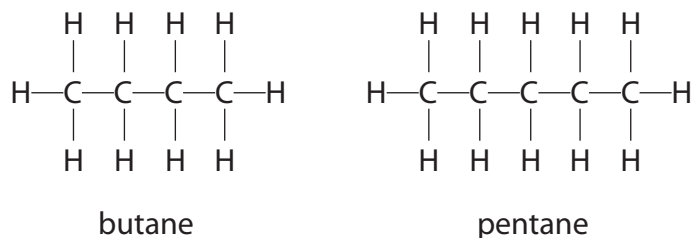
State how this property for kerosene compares with the property for diesel oil. (1)

property .....

comparison .....



- (c) Figure 9 shows the formulae of a molecule of butane and of a molecule of pentane. Butane and pentane are neighbouring members of the same homologous series.



**Figure 9**

- (i) Explain, using these formulae, why butane and pentane are neighbouring members of the same homologous series.

(2)

.....

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.....

- (ii) Butane has the formula  $\text{C}_4\text{H}_{10}$ .

Calculate the mass of carbon in 100 g of butane.

Give your answer to three significant figures.

(relative atomic masses:  $\text{H} = 1.00$ ,  $\text{C} = 12.0$ ;  
relative formula mass:  $\text{C}_4\text{H}_{10} = 58.0$ )

You must show your working.

(3)

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mass of carbon = ..... g

- (iii) Butane burns completely in air to form carbon dioxide and water.

Write the word equation for this reaction.

(2)

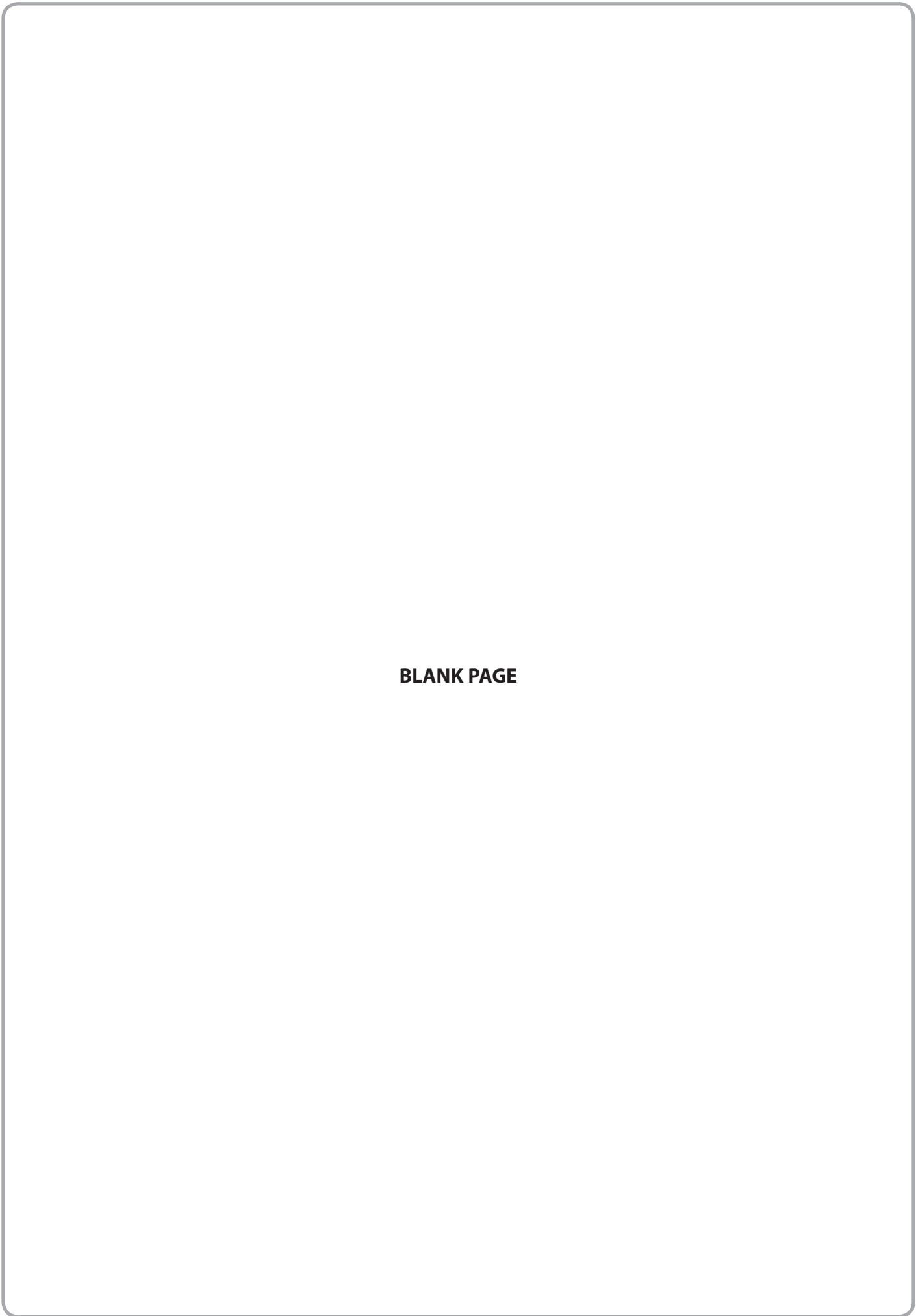
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**(Total for Question 5 = 11 marks)**



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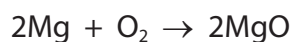
- 6 (a) An aluminium atom has the atomic number 13 and the mass number 27.

Which row shows the numbers of subatomic particles present in an aluminium ion,  $\text{Al}^{3+}$ ?

(1)

	protons	neutrons	electrons
<input type="checkbox"/> A	13	14	13
<input type="checkbox"/> B	13	14	10
<input type="checkbox"/> C	14	13	10
<input type="checkbox"/> D	14	13	17

- (b) Magnesium burns in excess oxygen to form magnesium oxide.  
The balanced equation for this reaction is



Starting with 1.35g of magnesium, calculate the maximum mass of magnesium oxide that could be formed in this reaction.  
(relative atomic masses: O = 16.0, Mg = 24.0)

You must show your working.

(3)

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mass of magnesium oxide = ..... g

- (c) Chlorine reacts with hydrogen to form hydrogen chloride.

Write the balanced equation for this reaction.

(3)

.....

.....



\*(d) Sodium chloride is an ionic compound, containing sodium ions,  $\text{Na}^+$ , and chloride ions,  $\text{Cl}^-$ .

Figure 10 shows the electronic configuration of sodium and chlorine.

	electron configuration
sodium	2.8.1
chlorine	2.8.7

**Figure 10**

Explain how sodium and chlorine atoms form the ions in sodium chloride and how the ions are arranged in the solid sodium chloride.

You may wish to use diagrams in your answer.

(6)

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**(Total for Question 6 = 13 marks)**

**TOTAL FOR PAPER = 60 MARKS**



# The periodic table of the elements

1	2	3	4	5	6	7	0										
7 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4	11 <b>Na</b> sodium 11	12 <b>Mg</b> magnesium 12	13 <b>Al</b> aluminium 13	14 <b>N</b> nitrogen 7	15 <b>P</b> phosphorus 15	16 <b>O</b> oxygen 8	17 <b>F</b> fluorine 9	18 <b>Ne</b> neon 10								
19 <b>K</b> potassium 19	20 <b>Ca</b> calcium 20	21 <b>Sc</b> scandium 21	22 <b>Ti</b> titanium 22	23 <b>V</b> vanadium 23	24 <b>Cr</b> chromium 24	25 <b>Mn</b> manganese 25	26 <b>Fe</b> iron 26	27 <b>Co</b> cobalt 27	28 <b>Ni</b> nickel 28	29 <b>Cu</b> copper 29	30 <b>Zn</b> zinc 30	31 <b>Ga</b> gallium 31	32 <b>Ge</b> germanium 32	33 <b>As</b> arsenic 33	34 <b>Se</b> selenium 34	35 <b>Br</b> bromine 35	36 <b>Kr</b> krypton 36
37 <b>Rb</b> rubidium 37	38 <b>Sr</b> strontium 38	39 <b>Y</b> yttrium 39	40 <b>Zr</b> zirconium 40	41 <b>Nb</b> niobium 41	42 <b>Mo</b> molybdenum 42	43 <b>Tc</b> technetium 43	44 <b>Ru</b> ruthenium 44	45 <b>Rh</b> rhodium 45	46 <b>Pd</b> palladium 46	47 <b>Ag</b> silver 47	48 <b>Cd</b> cadmium 48	49 <b>In</b> indium 49	50 <b>Sn</b> tin 50	51 <b>Sb</b> antimony 51	52 <b>Te</b> tellurium 52	53 <b>I</b> iodine 53	54 <b>Xe</b> xenon 54
55 <b>Cs</b> caesium 55	56 <b>Ba</b> barium 56	57 <b>La*</b> lanthanum 57	72 <b>Hf</b> hafnium 72	73 <b>Ta</b> tantalum 73	74 <b>W</b> tungsten 74	75 <b>Re</b> rhenium 75	76 <b>Os</b> osmium 76	77 <b>Ir</b> iridium 77	78 <b>Pt</b> platinum 78	79 <b>Au</b> gold 79	80 <b>Hg</b> mercury 80	81 <b>Tl</b> thallium 81	82 <b>Pb</b> lead 82	83 <b>Bi</b> bismuth 83	84 <b>Po</b> polonium 84	85 <b>At</b> astatine 85	86 <b>Rn</b> radon 86
133	137	139	178	181	184	186	190	192	195	197	201	204	207	209	[209]	[210]	[222]
<b>Li</b>	<b>Be</b>	<b>La*</b>	<b>Hf</b>	<b>Ta</b>	<b>W</b>	<b>Re</b>	<b>Os</b>	<b>Ir</b>	<b>Pt</b>	<b>Au</b>	<b>Hg</b>	<b>Tl</b>	<b>Pb</b>	<b>Bi</b>	<b>Po</b>	<b>At</b>	<b>Rn</b>
lithium	beryllium	lanthanum	hafnium	tantalum	tungsten	rhenium	osmium	iridium	platinum	gold	mercury	thallium	lead	bismuth	polonium	astatine	radon

1	<b>H</b>	hydrogen	1
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relative atomic mass
<b>atomic symbol</b>
name
atomic (proton) number

\* The elements with atomic numbers from 58 to 71 are omitted from this part of the periodic table.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

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