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In the signatu		above,	write	your ce	entre nu	ımber,	candi	idate r	umbe	r, you	r surn	ame a	nd initial(s) and your	10	0	
The pa	per re												rect question paper.			
Show	all stag	ges in a	any cal	culatio	ns and	state	the un	its. C	alcula	tors m	ay be	used.	uestion paper.			
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e.g. (2)	<b>)</b> .				estion				_							
	are 24	pages	in this	questi	on pap			nk pag	es are	indic	ated.					

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Write your answers neatly and in good English.

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**Advice to Candidates** 



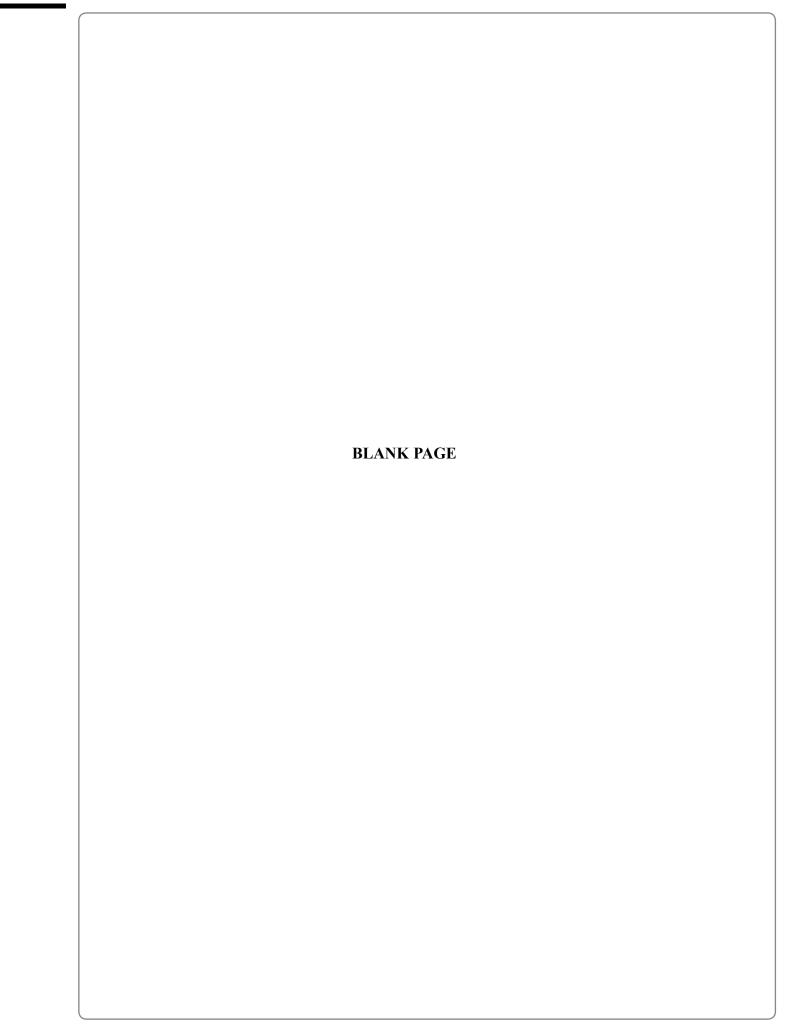


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Total

	0	Helium 2	Neon 10 Argon	Krypton 36 36 X 84 X 8	Radon 86	
	7		Fluorine 9 35.5 Chlorine	80 Bromine 35 35 127 127 53	Asiatine 85	
	9		Ocygen 8 8 Sulphur	Selenium 34 Tellurium 52 Selesium 34 Selesium 34 Selesium 34 Selesium 35 Seles	Polonium 84	
	5		Nitrogen 7 31 Phosphorus	Arsenic 33 122 Sb Antimony 51	209 Bismuth 83	
	4		Carbon 6 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Germanium 32 Sn Tin 50		
	က			Gallium Gallium 115 115 115 149		
				65 Zn Zinc 30 30 112 Cd Cadmium 48	1	
<b>TABLE</b>				63.5 Cu Copper 29 108 Ag A7		
THE PERIODIC TABLE						
PERIC				S9 CObait 27 103 Hodium Pai	1	
里						
	<u>a</u>			Fe Fe Iron 26 101 M Ruthenium Ruthenium 844 44	190 OS	Key Relative atomic mass Symbol Name Atomic number
	Group	Hydrogen		52 55 Cr Mn Chromium Manganese 24 25 96 99 Mo Molybdenum Technetium	Rhenium 75	Relative m. Sy Sy Atomic
				Chromium M 24 24 96 Molyodenum T. 4.2	184 W Tungsten 74	
				Vanadium 23 23 93 Niobium 41	Tantalum 73	
				48 Titanium 22 91 Zirconium 40	Hamium 72	
				Scandium 21	La anthanum 57 227 AC Actinium 89	
	7		9 BBe Beryllium 4 24 Mg Magnesium	Calcium 20 88 Strontium 340 St	Barum L S6 226 Padium R 88	
	-		Lithium 3 3 23 Sodium N			
		Period 1	α κ	4 rv	9 1	

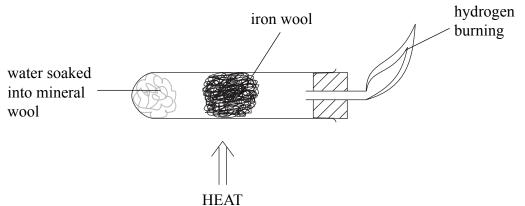
			Leave blank
		SECTION A	
1.	Use	the Periodic Table on page 2 to help you to answer this question.	
	(a)	Give the name or symbol of the least reactive element in Group 1.	
	(b)	(1) Cive the name or expubal of the least reactive element in Deriod 2	
	(0)	Give the name or symbol of the least reactive element in Period 3.	
		(1)	
	(c)	Give the name or symbol of an element whose atoms have one electron in the outer shell.	
		(1)	
	(d)	Give the names or symbols of <b>two</b> elements that have similar chemical properties.	
		(1)	
	(e)	Give the name or symbol of a metal which reacts with cold water to form an alkaline solution.	
		(1)	Q1
		(Total 5 marks)	



a) willen	of these particles			
(i) ha	s no electrical cha	arge?		
				(1)
(ii) ha	s the lowest mass	s?		
				(1)
(iii) orl	bits the nucleus?			
				(1)
N The tel	hla halaw giyas s	omo information on t	yya diffarant atams a	
)) The lat	ole delow gives so	ome information on t	wo different atoms o	1 IIuiiuiii.
		Mass number	Atomic number	
	first atom	6	3	
(i) W	second atom	7	3	umber but different
	second atom		3	umber but different
(ii) Co	second atom  hat is the name grass numbers?  omplete the senter	7	th the same atomic no	(1)
(ii) Co	second atom  hat is the name grass numbers?  omplete the senter	nces by using number once or not at all.	th the same atomic no	(1)
ma (ii) Co	second atom  hat is the name grass numbers?  omplete the sentered once, more that	nces by using number an once or not at all.	th the same atomic north the same atomic nor	(1)
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(ii) Coust	second atom  hat is the name grass numbers?  omplete the sentered once, more that a grass of lithium	nces by using number an once or not at all.  4 6 10 12	rs from the box. Each otons ande	(1) ch number may be

**(2)** 

**3.** Steam reacts with hot iron. The products are a dark coloured solid and hydrogen gas. The hydrogen gas can be burned off.



		HEAI	
(a)	Wri	te a word equation for the reaction of steam with iron.	
		(1)	
(b)	Wh	en hydrogen burns, steam forms.	
	(i)	How can steam be turned into liquid water?	
		(1)	
	(ii)	Describe and give the result of a <b>physical</b> test to show that a liquid is pure water.	
		Test	
		Result	

	sulphate. Give the <b>name</b> of the product.
	Colour change
	Name of product
(d)	The product in (c) is heated until another colour change occurs. Give the final colour of the solid and state the type of reaction that occurs.
	(2)
	(Total 9 marks)
	(Total > marks)

**4.** (a) Aluminium, copper and iron are three important metals. Complete the table by selecting from the boxes one use for each metal and the property on which this use depends.

Each use and property may be used once, more than once or not at all.

	Uses		
aircraft bodies	railway tracks	solder	water pipes

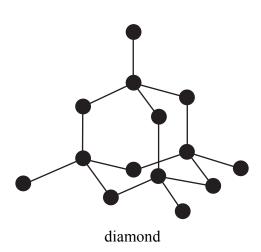
Properties
good conductor of electricity low density
resists corrosion strong

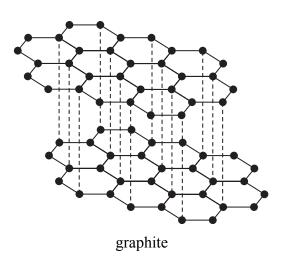
Name of metal	Use of metal	Property on which this use depends
aluminium		
copper		
iron		

**(6)** 

	luminium is extracted using electrolysis. The diagram shows part of an electrolysell.	Leav blank
	aluminium oxide dissolved in molten cryolite	
D	uring electrolysis, oxygen gas forms at the positive electrode.	
(i)	•	1)
(ii	i) Explain why this electrode must be replaced at regular intervals.	
(ii	ii) The aluminium oxide is dissolved in molten cryolite.	
	Put a cross (⋈) in <b>one</b> box to show the main reason for this.	
	Put a cross (⋈) in <b>one</b> box to show the main reason for this.  Aluminium is extracted from cryolite. □	
	Aluminium is extracted from cryolite.   Cryolite is a compound of sodium, aluminium and fluorine.  The solution has a lower melting point than pure aluminium oxide.	1)
	Aluminium is extracted from cryolite.   Cryolite is a compound of sodium, aluminium and fluorine.  The solution has a lower melting point than pure aluminium oxide.	1)
	Aluminium is extracted from cryolite.   Cryolite is a compound of sodium, aluminium and fluorine.   The solution has a lower melting point than pure aluminium oxide.   (on is extracted from iron ore by reduction using carbon monoxide.	1)
(c) Ir	Aluminium is extracted from cryolite.  ☐  Cryolite is a compound of sodium, aluminium and fluorine.  ☐  The solution has a lower melting point than pure aluminium oxide.  ☐  on is extracted from iron ore by reduction using carbon monoxide.  (complete the word equation.  iron(III) oxide + carbon monoxide →+	1)
(c) Ir	Aluminium is extracted from cryolite. ☐  Cryolite is a compound of sodium, aluminium and fluorine. ☐  The solution has a lower melting point than pure aluminium oxide. ☐  (on is extracted from iron ore by reduction using carbon monoxide.  () Complete the word equation.  iron(III) oxide + carbon monoxide →	1) on
(c) Ir	Aluminium is extracted from cryolite. ☐  Cryolite is a compound of sodium, aluminium and fluorine. ☐  The solution has a lower melting point than pure aluminium oxide. ☐  (on is extracted from iron ore by reduction using carbon monoxide.  Complete the word equation.  iron(III) oxide + carbon monoxide →	1) on

9





(a) Use words from the box to complete the sentences. Each word may be used once, more than once or not at all.

allotropes	carbon	isomers
isotopes	silicon	sulphur

Different structural forms of the same element are called .....

- (b) When graphite burns it forms carbon dioxide.
  - (i) Identify the element with which graphite reacts to form carbon dioxide.

(1)

(ii) Put a cross (☒) in **one** box to show the test for carbon dioxide and put a cross (☒) in **one** box to show the positive result.

Test Positive result

add carbonic acid □ bubbles □

add limewater □ turns milky □

add sodium hydroxide □ turns orange □

(2)

	1 🗵			
	3			
	5			
	7			
	9 🖾			
	11 🗵			(1)
Complete the pass			ot at all	(1)
Each word may be	e used once, mo	ore than once or no		(1)
Complete the pass Each word may be			ot at all.	(
Each word may be atoms molecules  Carbon dioxide ha	high small	large strong boiling poi	ot at all.  low weak  int. This is because	there
atoms molecules  Carbon dioxide ha	high small	large strong  boiling point ttraction between	low weak  Int. This is because	there

11

Turn over

**(1)** 

**(1)** 

**6.** (a) The table shows the displayed formulae of some organic compounds.

Compound	Displayed formula
A	H H     H—C—C—H     H H
В	H H     H—C—C—O     H H H
C	H H C=C
D	H H H       H—C—C—C—H       H H H
E	H H C=C H H H

- (i) Select one compound from the table which is an alkene.

  (1)

  (ii) Give the molecular formula of compound C.
- (iii) Give the general formula for the homologous series of which compound  ${\bf D}$  is a member.
- (iv) Select one compound from the table which is an unsaturated hydrocarbon.

  (1)

Leave
hlank

(v) Select one compound from the table which would form an addition polymer having the structure:

- (1)
- (b) (i) Draw the displayed formula of butane.

(2)

(ii) What colour change, if any, is seen when butane is bubbled through bromine water? Explain your answer.

**(2)** 

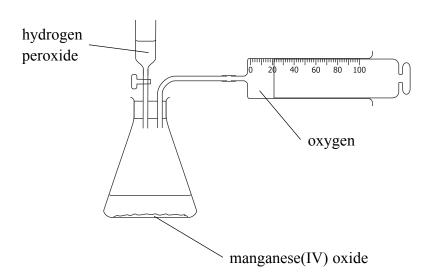
	e pie chart shows some uses of poly(ethene).	Leave blank
	other blow film	
	extrusions injection moulding	
	covering on electrical wires	
(i)	What is the main use of poly(ethene)?	
	(1)	
(ii)	What property of poly(ethene) makes it suitable for use as a covering on electrical wires?	
	(1)	Q6
	/T / 111 1 )	
	(Total 11 marks)  TOTAL FOR SECTION A: 55 MARKS	



**(1)** 

## **SECTION B**

**7.** Oxygen gas can be prepared and collected in the laboratory using the apparatus shown in the diagram.



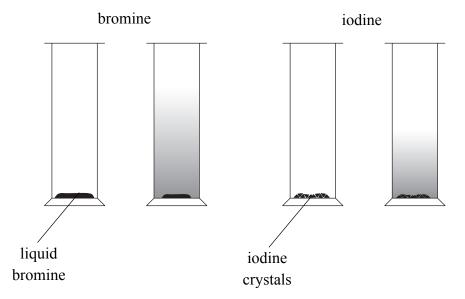
(a) Hydrogen peroxide decomposes very slowly to form water and oxygen.

	(i)	Write a word equation for this reaction.
		(1)
	(ii)	The reaction is much faster if a small amount of manganese(IV) oxide is added. What type of substance is manganese(IV) oxide in this reaction?
		(1)
(b)		diagram shows oxygen gas being collected in a syringe. gest one other way to collect the gas.
		(1)
(c)	Des	cribe the test for oxygen.

(iii) Write the formula of each of the ions in lithium oxide.  Lithium ion		(1)
(3)  (iii) Write the formula of each of the ions in lithium oxide.  Lithium ion  Oxide ion  (2)	(ii)	
(3)  (iii) Write the formula of each of the ions in lithium oxide.  Lithium ion  Oxide ion  (2)		Li O
(iii) Write the formula of each of the ions in lithium oxide.  Lithium ion		Describe what happens, in terms of electrons, when lithium reacts with oxygen.
Oxide ion		
(iii) Write the formula of each of the ions in lithium oxide.  Lithium ion		
(iii) Write the formula of each of the ions in lithium oxide.  Lithium ion		
Lithium ion   Oxide ion (2)		
Oxide ion(2)	(iii)	
(2)		
(Total 10 marks)		
		(Total 10 marks)

**8.** A few drops of liquid bromine and a few crystals of solid iodine are placed in the bottom of separate gas jars and the open ends covered with lids. The jars are left for some time under the same conditions.

The diagrams show the jars just after the bromine and iodine are added, and after some time.



(a) State the colour of

liquid bromine	 	
1		

(b) The diagrams show that the particles of bromine and iodine spread out in the jars.

(i)	What is the name of this process?	
		(1)

(ii) The iodine changes into a gas before this process occurs. The chemical equation for this change is

$$I_2(s) \rightarrow I_2(g)$$

The change involving bromine is called evaporation. Write a chemical equation, including state symbols, for this change.

.....

**(2)** 

**(2)** 

18

	(iii) Describe how the movement and spacing of the particles in $I_2(g)$ is different from that in $I_2(s)$ .	Dm Lea
	Movement	
	Spacing	 (2)
(c)	The gases chlorine and hydrogen react together to form hydrogen chloride gas. Hydrogen chloride gas dissolves in water to form hydrochloric acid.	
	Bromine reacts in a similar way to chlorine.	
	(i) Write a word equation for the reaction between bromine and hydrogen.	
		(1)
	(ii) Suggest the name of the acid formed when the product in (c)(i) dissolves water.	in
		(1)

(d) The diagram shows apparatus for electrolysing lead(II) bromide.	Leave blank
A \ battery - bulb	
lead(II) bromide	
(i) When the apparatus is set up as shown, electrolysis does not occur.  State what must be done before electrolysis can occur.	
(ii) When electrolysis occurs, particles <b>A</b> , <b>B</b> and <b>C</b> move in the directions shown b the arrows in the diagram. Identify each of these particles. <b>A</b>	
B	
(e) Explain why the reaction at the negative electrode is described as reduction.	
(1 (Total 14 marks	

9.	(a)	Potassium hydroxide solution reacts with dilute nitric acid to form the salt potassium nitrate.	Leave
		(i) State the type of reaction that occurs.	
		(ii) Write a chemical equation for the reaction.	
		(ii) write a chemical equation for the reaction.  (2)	
	(b)	A titration is carried out to find the volume of dilute nitric acid that must be added to 25.0 cm <sup>3</sup> of potassium hydroxide solution for complete reaction.	
		(i) Which piece of apparatus is used to add the dilute nitric acid?	
		(1)	
		(ii) Before the acid is added, a few drops of phenolphthalein are mixed with the potassium hydroxide solution. State the colour change of the phenolphthalein at the end point of the titration.	
		(2)	
	(c)	35.00 cm <sup>3</sup> of dilute nitric acid reacted completely with 25.0 cm <sup>3</sup> of potassium hydroxide solution. Use this information to describe how you could obtain pure dry crystals of potassium nitrate, starting from the solutions of nitric acid and potassium hydroxide.	
		(5) (Total 11 marks)	Q9

a catalyst.  (i) Write the chemical equation for this reaction.  (1)  (ii) Name the catalyst used.  (1)	CH <sub>3</sub> CH <sub>2</sub> OH  (a) In industry, ethene is converted to ethanol by reacting it with steam in the pres a catalyst.  (i) Write the chemical equation for this reaction.  (ii) Name the catalyst used.	(1)
(i) Write the chemical equation for this reaction.  (1)  (ii) Name the catalyst used.  (1)  (b) Ethanol can also be made by fermentation. Describe how this is done.	a catalyst.  (i) Write the chemical equation for this reaction.  (ii) Name the catalyst used.	(1)
(ii) Name the catalyst used.  (b) Ethanol can also be made by fermentation. Describe how this is done.	(ii) Name the catalyst used.	
(ii) Name the catalyst used.  (1)  (b) Ethanol can also be made by fermentation. Describe how this is done.		
(ii) Name the catalyst used.  (1)  (b) Ethanol can also be made by fermentation. Describe how this is done.		
(b) Ethanol can also be made by fermentation. Describe how this is done.		(1)
(b) Ethanol can also be made by fermentation. Describe how this is done.	(b) Ethanol can also be made by fermentation. Describe how this is done.	(1)
(b) Ethanol can also be made by fermentation. Describe how this is done.	(b) Ethanol can also be made by fermentation. Describe how this is done.	
	(b) Ethanol can also be made by letinentation. Describe now this is done.	
(4)		
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(4)		
(4)		
(4)		
(4)		
(4)		

(c)		anol is converted to ethyl ethanoate by warming it with ethanoic acid in the sence of a catalyst.	blank	
	(i)	Write the chemical equation, including state symbols, for this reaction.		
		(3)		
	(ii)	How can a student detect the formation of ethyl ethanoate in this reaction?		
		(1)	Q10	
		(Total 10 marks)		
		TOTAL FOR SECTION B: 45 MARKS		
		TOTAL FOR PAPER: 100 MARKS		
		END		
		END		

