



THE PERIODIC TABLE

Group 0

Group 1

Group 2

Group 3

Group 4

Group 5

Group 6

Group 7

Period 1

Period 2

Period 3

Period 4

Period 5

Period 6

Period 7

4	He	Helium	2
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1	H	Hydrogen	1
---	---	----------	---

11	B	Boron	5	12	C	Carbon	6	13	Al	Aluminium	13	14	N	Nitrogen	7	15	P	Phosphorus	15	16	O	Oxygen	8	17	F	Fluorine	9	18	Ne	Neon	10																																																																																																
27	Al	Aluminium	13	28	Si	Silicon	14	29	Sc	Scandium	21	30	Zn	Zinc	30	31	Ga	Gallium	31	32	Ge	Germanium	32	33	As	Arsenic	33	34	Se	Selenium	34	35	Br	Bromine	35	36	Kr	Krypton	36																																																																																								
55	Mn	Manganese	25	56	Fe	Iron	26	57	La	Lanthanum	57	58	Ce	Cerium	58	59	Pr	Praseodymium	59	60	Nd	Niodymium	60	61	Pm	Promethium	61	62	Sm	Samarium	62	63	Eu	Europium	63	64	Gd	Gadolinium	64	65	Tb	Terbium	65	66	Dy	Dysprosium	66	67	Ho	Holmium	67	68	Er	Erbium	68	69	Tm	Thulium	69	70	Yb	Ytterbium	70	71	Lu	Lutetium	71																																																												
89	Y	Yttrium	39	90	Zr	Zirconium	40	91	Nb	Niobium	41	92	Mo	Molybdenum	42	93	Tc	Technetium	43	94	Ru	Ruthenium	44	95	Rh	Rhodium	45	96	Pd	Palladium	46	97	Ag	Silver	47	98	Cd	Cadmium	48	99	In	Indium	49	100	Sn	Tin	50	101	Sb	Antimony	51	102	Te	Tellurium	52	103	I	Iodine	53	104	Xe	Xenon	54																																																																
133	Cs	Caesium	55	134	Ba	Barium	56	135	La	Lanthanum	57	136	Ce	Cerium	58	137	Pr	Praseodymium	59	138	Nd	Niodymium	60	139	Pm	Promethium	61	140	Sm	Samarium	62	141	Eu	Europium	63	142	Gd	Gadolinium	64	143	Tb	Terbium	65	144	Dy	Dysprosium	66	145	Ho	Holmium	67	146	Er	Erbium	68	147	Tm	Thulium	69	148	Yb	Ytterbium	70	149	Lu	Lutetium	71																																																												
223	Fr	Francium	87	224	Ra	Radium	88	225	Ac	Actinium	89	226	Th	Thorium	90	227	Pa	Protactinium	91	228	U	Uranium	92	229	Np	Neptunium	93	230	Pu	Plutonium	94	231	Am	Americium	95	232	Cm	Curium	96	233	Bk	Berkelium	97	234	Cf	Californium	98	235	Es	Einsteinium	99	236	Fm	Fermium	100	237	Mn	Mendelevium	101	238	Nv	Nobelium	102	239	Lr	Lutetium	103	240	Rf	Rutherfordium	104	241	Db	Dubnium	105	242	Sg	Seaborgium	106	243	Bh	Berkelium	107	244	Hs	Hassium	108	245	Mt	Mendelevium	109	246	Ds	Darmstadtium	110	247	Rg	Rutherfordium	111	248	Cn	Copernicium	112	249	Nh	Nihonium	113	250	Fl	Flerovium	114	251	Mc	Moscovium	115	252	Lv	Livermorium	116	253	Ts	Tennessium	117	254	Og	Oganesson	118

Key

Relative atomic mass
Symbol
Name
Atomic number



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**SECTION A**

1. Use the Periodic Table on page 2 to help you answer this question.

(a) How many periods are shown in the Periodic Table?

.....  
(1)

(b) Which element is in both Period 2 and Group 3?

.....  
(1)

(c) Which two types of particle are present in the nucleus of a helium atom?

.....  
(1)

(d) How many protons are in an atom of neon?

.....  
(1)

(e) Which two elements in Period 6 have the same relative atomic mass?

.....  
(1)

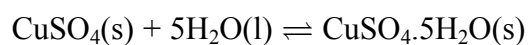
**(Total 5 marks)**

Q1



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2. A reaction involving copper(II) sulphate can be represented by the equation



The reaction is described as reversible because it can go in either direction.

(a) State the colour change of the copper(II) sulphate in the forward reaction.

Colour at start .....

Colour at finish .....

(2)

(b) Use words from the box to complete a description of this reaction.

<b>dehydration</b>	<b>endothermic</b>	<b>evaporation</b>
<b>exothermic</b>	<b>hydration</b>	<b>neutralisation</b>

Each word may be used once or not at all.

The forward reaction is described as ..... because there is an increase in temperature. The type of reaction occurring is .....

The reverse reaction can be described as both ..... and .....

(4)

Q2

(Total 6 marks)



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3. Ammonia is manufactured by the Haber process.

(a) Name the two gaseous elements used to manufacture ammonia and state one source of each.

Name of element 1 .....

Source of element 1 .....

Name of element 2 .....

Source of element 2 .....

(4)

(b) State the pressure and the temperature used in the Haber process.

Pressure .....

Temperature .....

(2)

(c) Name two important chemicals made from ammonia.

1 .....

2 .....

(2)

Q3

(Total 8 marks)

5

Turn over



4. (a) Chlorine is an element in Group 7 of the Periodic Table.  
 Chlorine reacts with hydrogen to form hydrogen chloride gas.  
 Hydrogen chloride gas dissolves in water to form hydrochloric acid.

(i) What common name is used for the elements of Group 7?

..... (1)

(ii) **Name** an element in Group 7 that is a dark-coloured solid at room temperature.

..... (1)

(iii) The table shows some information about chlorine, hydrogen chloride and hydrochloric acid.

Complete the table.

Name of substance	Colour	State symbol	Effect on damp blue litmus paper
Chlorine	pale green		
Hydrogen chloride		g	
Hydrochloric acid			paper turns red

(6)



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(b) A student adds chlorine to a solution of sodium bromide. The solution changes from colourless to yellow-orange.

(i) Write a word equation for the reaction that occurs.

.....  
.....

(1)

(ii) State the type of reaction that occurs.

.....

(1)

(c) Another student adds bromine to a solution of sodium chloride. Why does no reaction occur?

.....

(1)

Q4

(Total 11 marks)

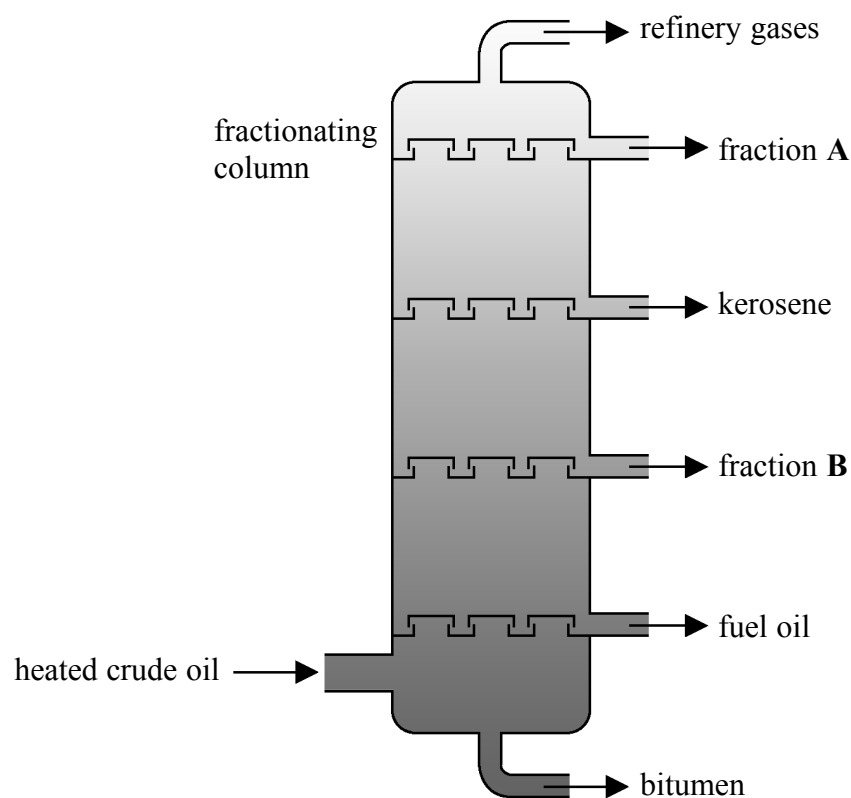
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7



Turn over

5. Crude oil is a complex mixture of hydrocarbons. The diagram shows how the hydrocarbons in crude oil can be separated into fractions by fractional distillation.



(a) Use words from the box to complete the description of fractional distillation.

Each word may be used once, more than once, or not at all.

<b>burns</b>	<b>condenses</b>	<b>decomposes</b>
<b>evaporates</b>	<b>higher</b>	<b>lower</b>

When the crude oil is heated, most of it .....

Each fraction ..... at a different level.

The temperature changes from the top to the bottom of the column.

The temperature is ..... at the top of the column.

The kerosene fraction collects at a higher level than the fuel oil fraction because kerosene has a ..... boiling point range.

(4)





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(b) Fractions **A** and **B** are both used in fuels for road vehicles. State the name of

fraction **A** .....

fraction **B** .....

(2)

(c) One compound present in fraction **A** is octane.

Write a word equation for the **complete** combustion of octane.

.....

.....

(2)

(d) The **incomplete** combustion of octane produces a poisonous gas. Identify the gas and explain why it is poisonous.

.....

.....

.....

.....

(2)

Q5

(Total 10 marks)

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6. Lithium and fluorine react together to form the ionic compound lithium fluoride.

(a) (i) What is the formula of each of the elements before the reaction occurs?

Lithium .....

Fluorine .....

(2)

(ii) What is the symbol of each of the ions formed in the reaction?

Lithium .....

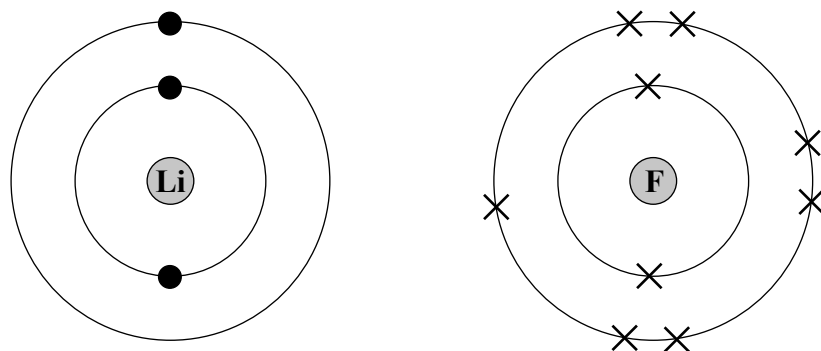
Fluoride .....

(2)

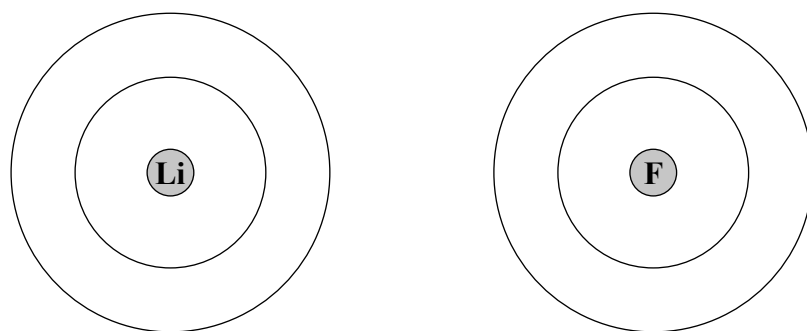


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(b) The diagrams show the electronic configurations of lithium and fluorine atoms.



Complete the following diagrams to show the electronic configurations of the lithium ion and fluoride ion formed in the reaction.



(2)

(c) This reaction can be described both as reduction and as oxidation.

State and explain which substance undergoes reduction and which substance undergoes oxidation.

Reduction .....

Oxidation .....

(2)

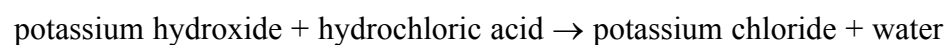
Q6

(Total 8 marks)



H 3 3 9 8 1 A 0 1 1 2 4

7. Potassium chloride is a soluble salt that can be prepared using the reaction



(a) Write a **chemical** equation for the reaction used to prepare potassium chloride.

.....  
 .....

(2)

(b) Solutions of potassium chloride and similar salts can be tested as shown in the table.

Complete the table.

Salt solution	Flame test	Addition of silver nitrate solution		
	Colour of flame	Result	Insoluble product formed	Soluble product formed
potassium chloride		white precipitate	silver chloride	potassium nitrate
sodium bromide				

(5)

Q7

(Total 7 marks)

**TOTAL FOR SECTION A: 55 MARKS**



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**SECTION B**

8. The pictures show some uses of metals.

a coating to prevent rusting



aircraft bodies



electrical wiring



railway tracks



Complete the table.

Use	Name of metal with this use	Property on which the use depends
a coating to prevent rusting		
aircraft bodies		
electrical wiring		
railway tracks		

(Total 8 marks)

Q8



H 3 3 9 8 1 A 0 1 3 2 4

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9. Use the Periodic Table on page 2 to help you answer this question.

(a) Identify the most reactive metallic element in the Periodic Table.

.....  
(1)

(b) Give the formula of the compound formed between sodium and the most reactive element in Group 7.

.....  
(1)

(c) All of the metals in Group 1 react with water. There are similarities between the reactions. Put a cross (☒) in **three** boxes to show which statements apply to the reactions of **all** Group 1 metals with water.

a flame is seen ☒

a solution of the metal hydroxide is formed ☒

a solution of the metal oxide is formed ☒

carbon dioxide is formed ☒

hydrogen is formed ☒

the metal sinks ☒

the solution formed is acidic ☒

the solution formed is alkaline ☒

(3)

(d) The elements in Group 0 were originally thought to be totally unreactive. However, in 1962 the first compound of xenon was made but it was not until 2000 that the first compound of argon was made.

What does this order of discovery suggest about the trend in reactivity of the elements in Group 0?

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

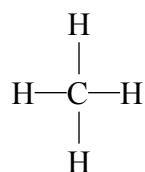
Q9

(Total 6 marks)



10. Methane, CH<sub>4</sub>, is an organic compound. It is the first member of an homologous series of **saturated hydrocarbons**.

The displayed formula of methane is



(a) What is meant by the term **hydrocarbon**?

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

(2)

(b) What is meant by the term **saturated**?

.....  
.....

(1)

(c) Name the homologous series of which methane is the first member.

.....

(1)

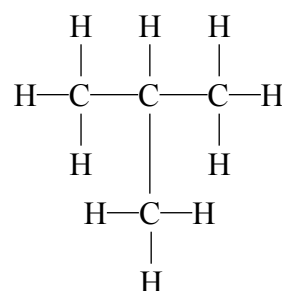
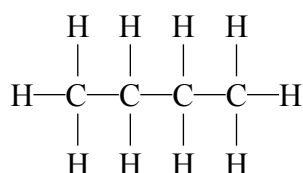
(d) Draw the displayed formula of the second member of this homologous series.

(2)





(e) The displayed formulae of two other organic compounds are



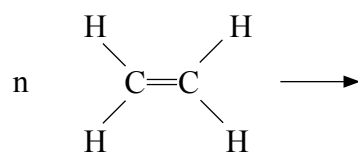
(i) What is the molecular formula of these two compounds?

..... (1)

(ii) What name is given to compounds that have the same molecular formula but different displayed formulae?

..... (1)

(f) Some other organic compounds are used to make polymers. Poly(ethene) is an addition polymer made from many identical monomer molecules. Complete the following equation to show the formation of poly(ethene).



(2)

(g) Nylon is another example of a polymer.

(i) What type of polymer is nylon?

..... (1)

(ii) Put a cross (☒) in the **two** boxes to show the types of monomers used in the manufacture of nylon.

- alcohol
- alkene
- diamine
- dicarboxylic acid

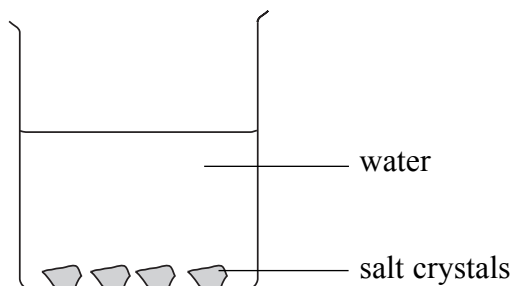
(2)

Q10

(Total 13 marks)



11. A few crystals of a green salt are placed in a beaker of cold water. The crystals start to dissolve.



(a) Describe how the appearance of the contents of the beaker change over a period of a few days.

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

(2)

(b) Name the process that occurs after the crystals dissolve.

.....

(1)

(c) How will the results of the experiment differ if hot water is used in place of cold water? Explain your answer.

Difference .....

.....

Explanation .....

.....

(2)

(d) A sample of the solution is removed from the beaker. Describe a test, and its result, that would show the sample contains ammonium ions.

Test .....

.....

Result .....

.....

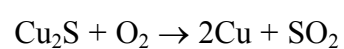
(3)

Q11

(Total 8 marks)



12. One way of obtaining the metal copper is by heating copper(I) sulphide in air.  
The equation for the reaction is



- (a) Explain why this reaction could be described as the oxidation of sulphur.

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

- (b) The sulphur dioxide produced reacts with water to form a single product. This product is an acid.

- (i) Write a chemical equation for the reaction of sulphur dioxide with water.

.....  
(1)

- (ii) Identify the ion in the product which causes it to be acidic.

.....  
(1)

- (iii) Name a substance that could be added to confirm the presence of this ion. What would be seen if this ion were present?

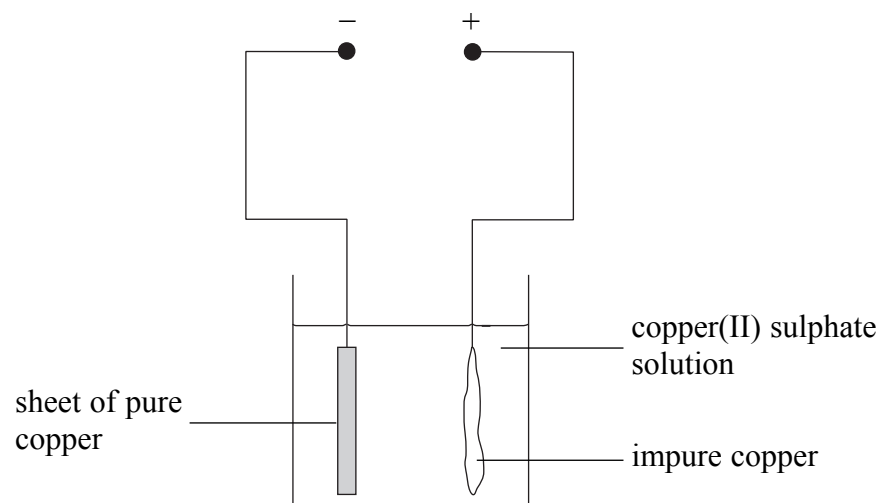
Substance added .....

What would be seen .....

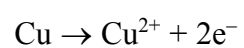
.....  
(2)



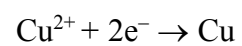
(c) Impure copper can be purified using the circuit shown:



The equation for the reaction at the positive electrode is



The equation for the reaction at the negative electrode is



What happens to the mass of the sheet of pure copper as the reactions occur? Explain your answer.

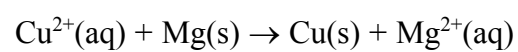
.....  
.....  
.....

(2)



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(d) Copper forms when magnesium reacts with copper(II) nitrate solution. The ionic equation for the reaction is



(i) What does this reaction indicate about the reactivity of copper?

.....  
(1)

(ii) Describe the colour change of the solution if an excess of magnesium is added.

Colour at start .....

Colour at finish .....

(2)

Q12

(Total 10 marks)

**TOTAL FOR SECTION B: 45 MARKS**

**TOTAL FOR PAPER: 100 MARKS**

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