

THE PERIODIC TABLE

Period 1 2 3 4 5 6 7 0 Group

1	1	2	3	4	5	6	7	0										
1	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 1 H Hydrogen 1 </div>								<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 4 He Helium 2 </div>									
2	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 7 Li Lithium 3 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 9 Be Beryllium 4 </div>							<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 20 Ne Neon 10 </div>									
3	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 23 Na Sodium 11 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 24 Mg Magnesium 12 </div>							<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 40 Ar Argon 18 </div>									
4	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 39 K Potassium 19 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 40 Ca Calcium 20 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 45 Sc Scandium 21 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 48 Ti Titanium 22 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 51 V Vanadium 23 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 52 Cr Chromium 24 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 55 Mn Manganese 25 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 56 Fe Iron 26 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 59 Co Cobalt 27 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 59 Ni Nickel 28 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 63.5 Cu Copper 29 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 65 Zn Zinc 30 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 70 Ga Gallium 31 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 73 Ge Germanium 32 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 75 As Arsenic 33 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 79 Se Selenium 34 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 80 Br Bromine 35 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 84 Kr Krypton 36 </div>
5	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 86 Rb Rubidium 37 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 88 Sr Strontium 38 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 89 Y Yttrium 39 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 91 Zr Zirconium 40 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 93 Nb Niobium 41 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 96 Mo Molybdenum 42 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 99 Tc Technetium 43 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 101 Ru Ruthenium 44 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 103 Rh Rhodium 45 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 106 Pd Palladium 46 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 108 Ag Silver 47 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 112 Cd Cadmium 48 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 115 In Indium 49 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 119 Sn Tin 50 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 122 Sb Antimony 51 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 127 Te Tellurium 52 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 127 I Iodine 53 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 131 Xe Xenon 54 </div>
6	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 133 Cs Caesium 55 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 137 Ba Barium 56 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 139 La Lanthanum 57 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 179 Hf Hafnium 72 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 181 Ta Tantalum 73 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 184 W Tungsten 74 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 186 Re Rhenium 75 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 190 Os Osmium 76 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 192 Ir Iridium 77 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 195 Pt Platinum 78 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 197 Au Gold 79 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 201 Hg Mercury 80 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 204 Tl Thallium 81 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 207 Pb Lead 82 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 209 Bi Bismuth 83 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 210 Po Polonium 84 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 210 At Astatine 85 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 222 Rn Radon 86 </div>
7	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 223 Fr Francium 87 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 226 Ra Radium 88 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 227 Ac Actinium 89 </div>															

Key

Relative atomic mass
Symbol
Name
Atomic number



SECTION A

Leave
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1. Look at the Periodic Table on page 2.

(a) How many elements are there in Period 2?

..... (1)

(b) How many noble gases are there?

..... (1)

(c) Give the symbol of the element whose atoms each contain 14 protons.

..... (1)

(d) Give the symbol of the element that has a relative atomic mass of 14.

..... (1)

(e) Which group contains elements that form ions with a 2- charge?

..... (1)

(Total 5 marks)

Q1



Leave blank

2. Use words from the box to complete the sentences.

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

allotropes	carbon	compounds	electrons
elements	hydrogen	neutrons	protons

- (a) Atoms of the same element always contain the same number of (1)
- (b) Isotopes are atoms of the same element which contain different numbers of (1)
- (c) Substances containing only one type of atom are (1)
- (d) Substances whose molecules contain more than one element are (1)
- (e) The negatively-charged particles in an atom are (1)
- (f) In the definition of relative atomic mass, the mass of an atom is compared to the mass of an atom of (1)

(Total 6 marks)

Q2



Leave
blank

3. The method used to separate the substances in a mixture depends on the properties of the substances in the mixture.

For each of the following, name a suitable method for obtaining

(a) water from potassium chloride solution

..... (1)

(b) potassium chloride from potassium chloride solution

..... (1)

(c) water from a mixture of calcium carbonate and water

..... (1)

(d) a red food dye from a mixture of coloured food dyes

..... (1)

(e) gasoline from crude oil.

..... (1)

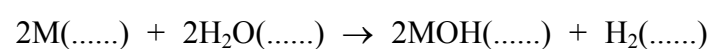
(Total 5 marks)

Q3



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4. The Group 1 elements all react with water to form hydrogen and an alkaline solution. In the following equation, the letter **M** represents one of the Group 1 elements.



- (a) Complete the equation using the correct state symbols (aq, g, l, s).
Each state symbol may be used once, more than once or not at all. (2)

- (b) Describe **two** observations you would make when a small piece of sodium is added to a trough of water.

1

.....

2

.....

(2)

- (c) Name a Group 1 element that reacts **less** vigorously with water than sodium does.

.....

(1)

- (d) Describe a test to show that the solution formed is alkaline.

Test

Result

(2)

Q4

(Total 7 marks)



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5. A student left a piece of iron in the open air for one week. At the end of the week, he noticed a colour change which showed that rust had formed on the iron.

(a) What colour shows that rust had formed?

.....
(1)

(b) Name the **two** substances needed for iron to rust.

1

2

(2)

(c) What is the chemical name of rust?

.....
(1)

(d) What type of reaction does the iron undergo when it rusts?

Put a cross (☒) in the correct box.

combustion ☒

decomposition ☒

oxidation ☒

reduction ☒

(1)

(e) Rust does not form on iron that is coated with zinc. Name this method of rust prevention.

.....
(1)

(f) State **one** other way to prevent iron from rusting.

.....
(1)

Q5

(Total 7 marks)

7

Turn over



6. A student adds a solution to solid samples of two different sodium compounds.

The equations for the reactions occurring are:



(a) Name the solution she adds to each sample.

..... (1)

(b) Describe **one** observation the student could make in Reaction 1.

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

(c) Describe a test for the carbon dioxide that forms in Reaction 1.

Test

Result (2)

(d) The sulphur dioxide formed in Reaction 2 turns damp blue litmus paper to red.

Explain why this colour change does not prove that the gas is sulphur dioxide.

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

(e) The sulphur dioxide formed in Reaction 2 combines with water in the atmosphere to form an acid.

Write a word equation for the formation of this acid.

..... (1)



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(f) In the atmosphere the reaction in part (e) contributes to acid rain.

Describe **two** effects of acid rain on the environment.

1

.....

2

.....

(2)

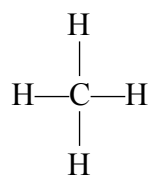
Q6

(Total 8 marks)



7. The alkanes are a homologous series of saturated hydrocarbons.

The displayed formula of the first member of this series is



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

(1)

(b) Give the molecular formula of the alkane with three carbon atoms.

..... (1)

(c) Draw a ring round the general formula for alkanes.

C_nH_{n+3} $\text{C}_n\text{H}_{2n+2}$ C_nH_{3n} C_nH_{4n} (1)

(d) Which **one** of the following is a characteristic of all homologous series?

Put a cross (☒) in the correct box.

all are gases at room temperature

same empirical formula

similar chemical properties.

(1)



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(e) Explain why alkanes are described as hydrocarbons.

.....

.....

(1)

(f) Write a word equation for the complete combustion of butane.

.....

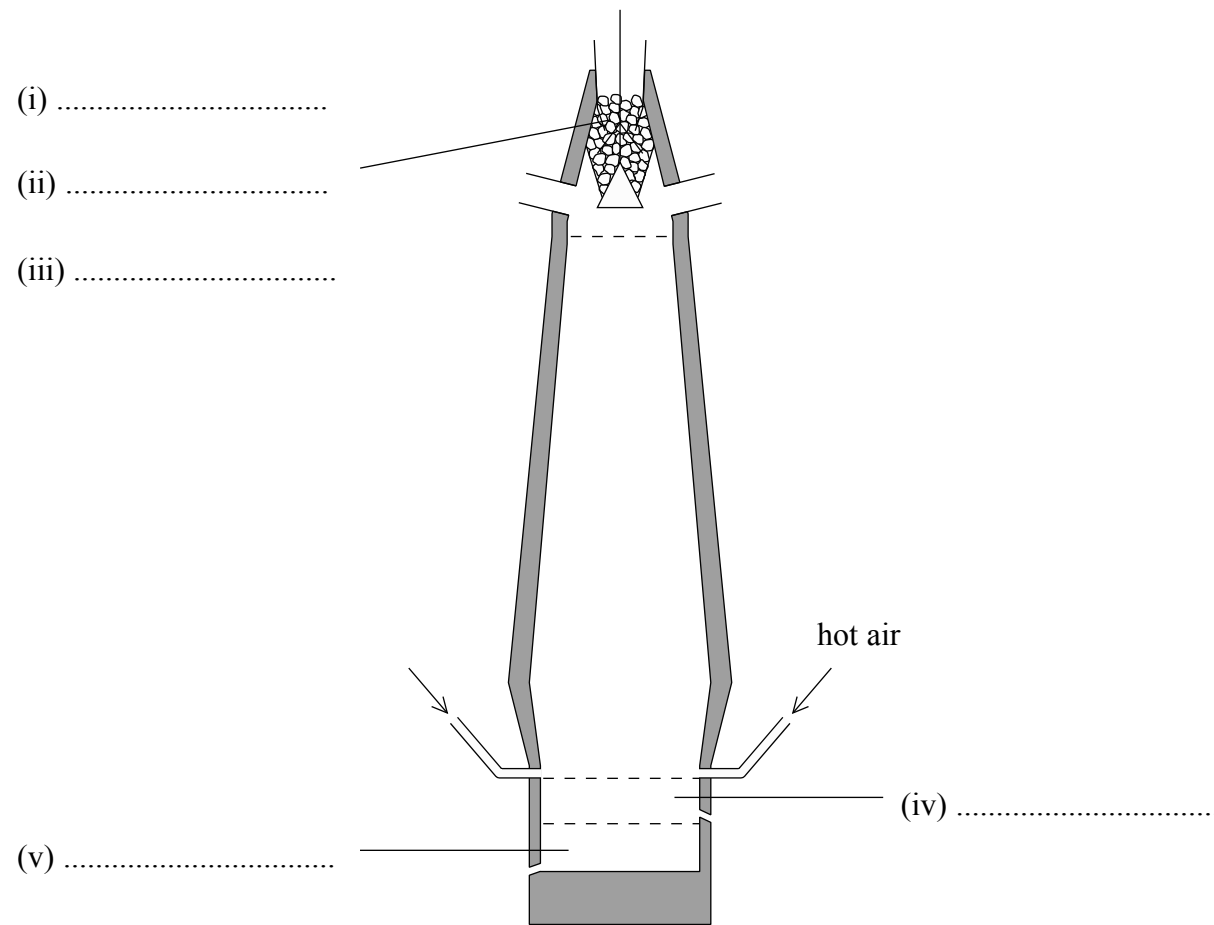
(2)

Q7

(Total 7 marks)



8. The diagram shows a blast furnace used to extract iron from its ore. The name of one of the raw materials is shown.



(a) Complete the labelling of the diagram using the names or formulae of the substances.

(5)



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(b) The word equations for two reactions occurring in the blast furnace are:

Reaction 1 carbon + oxygen → carbon dioxide

Reaction 2 carbon dioxide + carbon → carbon monoxide

(i) Which of these reactions (**1** or **2**) produces a high temperature in the blast furnace?

.....
(1)

(ii) State, with a reason, which substance in Reaction **2** undergoes reduction.

Substance

Reason

.....
(2)

(c) Why is it important that carbon monoxide is **not** released into the atmosphere?

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

(d) Why is aluminium not extracted from its ore using a blast furnace?

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

Q8

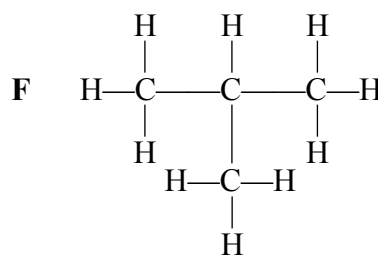
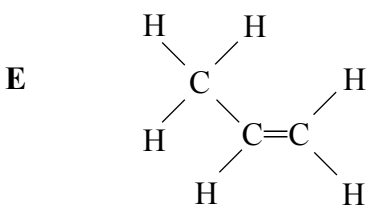
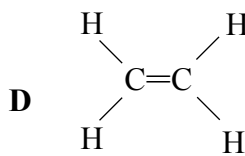
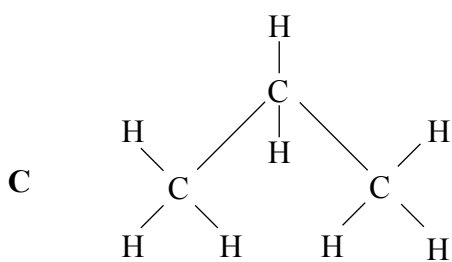
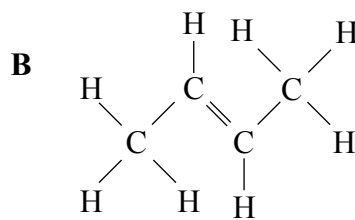
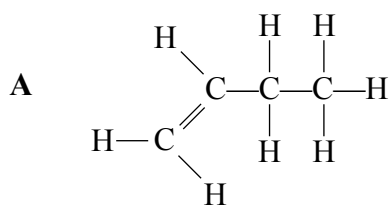
(Total 10 marks)

TOTAL FOR SECTION A: 55 MARKS



SECTION B

9. These are the structures of six hydrocarbons.



(a) Use the letters of the hydrocarbons to answer these questions.

(i) Give the letter of a hydrocarbon which is **not** an alkene. (1)

(ii) Which **two** hydrocarbons are isomers? (1)

(iii) Which structure is propene? (1)

(b) Hydrocarbon **D** forms a polymer. Give the name of this polymer and draw a diagram to represent the structure of the polymer.

Name of polymer

Structure of polymer

(3)

Q9

(Total 6 marks)



10. (a) Atoms contain smaller particles. Complete the table to show the relative mass and relative charge of each particle.

Particle	Relative mass	Relative charge
electron		
neutron	1	
proton		+1

(4)

(b) Use the Periodic Table on page 2 to name an element whose atoms

(i) contain equal numbers of protons and neutrons (1)

(ii) have the electronic configuration 2.8.4 (1)

(iii) have no neutrons. (1)

(c) Scientists think they will soon make an element that will go directly below astatine in the Periodic Table. Suggest how many electrons an atom of this element would have in its outer electron shell.

..... (1)

(d) The diagrams show the electronic configuration of helium and of neon.



(i) What is the similarity in the outer electron shells of these two atoms?
..... (1)

(ii) What effect does this similarity have on the chemical reactivity of helium and neon?
..... (1)

(Total 10 marks)

Q10

--	--



11. Use information from the table to answer this question.

↑ increasing reactivity	Name of metal	Colour of solid metal	Colour of a solution of the metal(II) sulphate
	magnesium	grey	colourless
	zinc	grey	colourless
	iron	dark grey	green
	copper	pink-brown	blue

(a) When zinc is added to magnesium sulphate solution, no reaction occurs. Explain why.

.....

 (1)

(b) When iron filings are added to copper(II) sulphate solution, a reaction takes place.

(i) Write a chemical equation for this reaction.

.....
 (2)

(ii) Describe the colour changes during this reaction.

Colour change of solid

.....

Colour change of solution

.....
 (4)

(c) When copper is added to dilute sulphuric acid, no reaction occurs. When iron is added to dilute sulphuric acid, hydrogen gas and iron(II) sulphate solution are formed. What does this show about the reactivity of hydrogen compared to the reactivity of copper and the reactivity of iron?

.....

 (2)

(Total 9 marks)

Q11



13. Hydrogen chloride, HCl, is a covalent compound. It is a colourless gas and is soluble in a number of solvents.

(a) (i) Draw a dot and cross diagram to show the covalent bonding in a molecule of hydrogen chloride. Show outer electrons only.

(2)

(ii) Hydrogen chloride has a low boiling point. Put a cross (☒) in the correct box to show the reason for this.

The covalent bonds are strong

The covalent bonds are weak

There are weak forces between the ions

There are weak forces between the molecules

(1)

(b) (i) Hydrochloric acid is a solution of hydrogen chloride in water. Give the **formula** of the species that makes the solution acidic.

.....
(1)

(ii) Explain why there is no colour change when universal indicator paper is added to a solution of hydrogen chloride in methylbenzene.

.....
(1)



Leave
blank

- (c) (i) When concentrated hydrochloric acid is added to solid potassium manganate(VII), chlorine gas is given off. Describe what is seen if a piece of damp universal indicator paper is held in the gas.

.....
.....
(2)

- (ii) Chlorine exists as two isotopes. Why do these isotopes have identical chemical properties?

.....
(1)

- (d) Iron forms two chlorides, iron(II) chloride and iron(III) chloride. Describe a chemical test that you could use to distinguish between these compounds.

Test

.....

Result with iron(II) chloride

Result with iron(III) chloride

(3)

Q13

(Total 11 marks)

TOTAL FOR SECTION B: 45 MARKS

TOTAL FOR PAPER: 100 MARKS

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