

THE PERIODIC TABLE

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Key

Relative atomic mass
Symbol
Name
Atomic number



SECTION A

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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



H 2 9 1 8 0 A 0 3 1 6

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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)

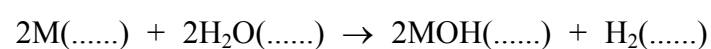
(Total 6 marks)

Q2



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3. 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) Describe a test to show that the solution formed is alkaline.

Test

Result

(2)

Q3

(Total 6 marks)



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4. 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)

Q4

(Total 7 marks)



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5. 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) Sulphur dioxide produced in Reaction 2 contributes to acid rain in the atmosphere.

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

1

.....

2

..... (2)

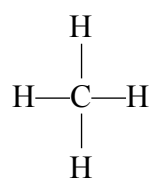
(Total 6 marks)

Q5



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

..... (2)

Q6

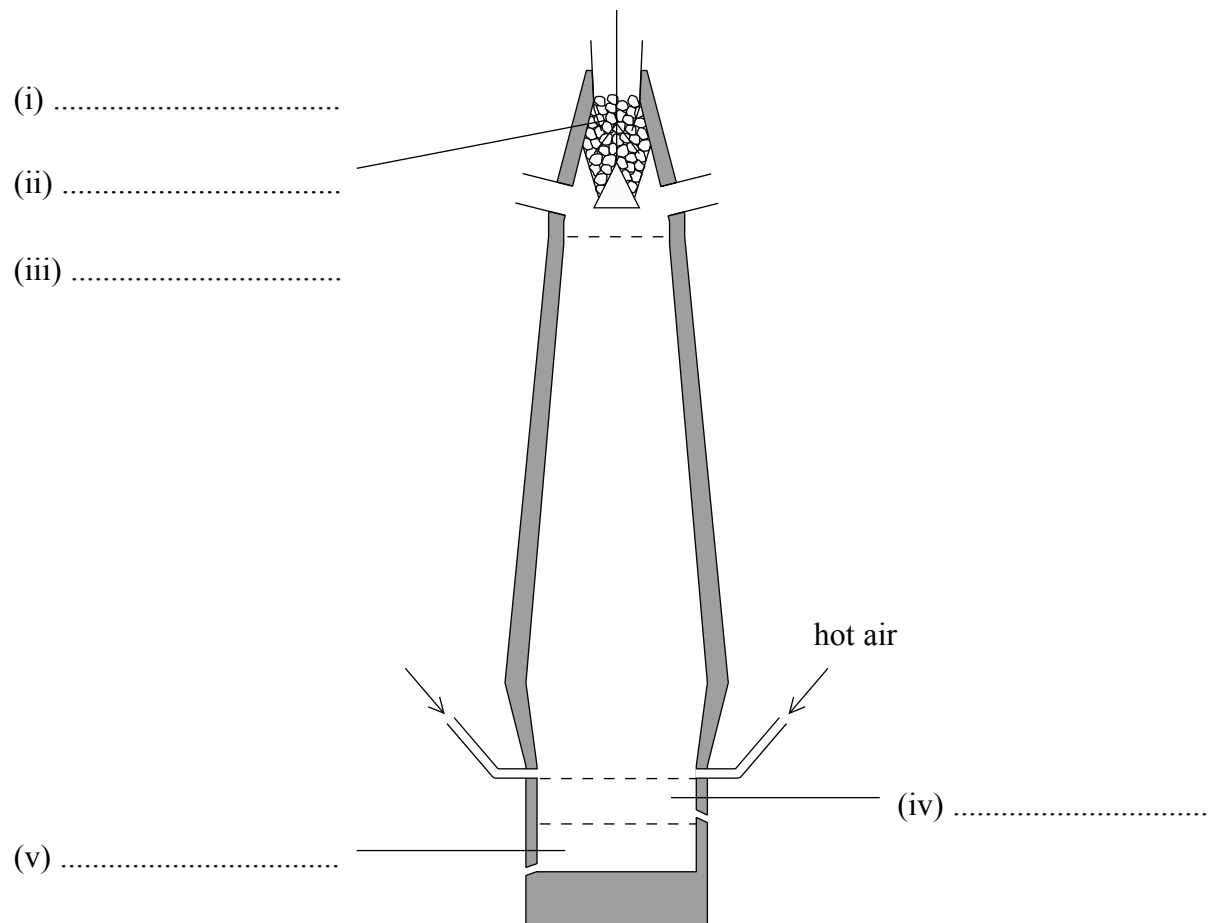
(Total 5 marks)



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7. 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)

Q7

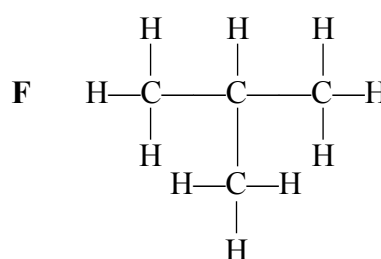
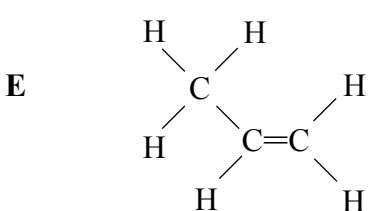
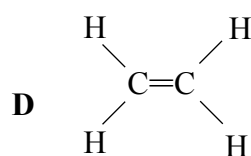
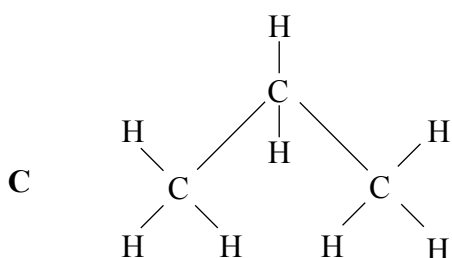
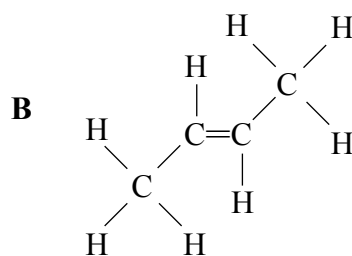
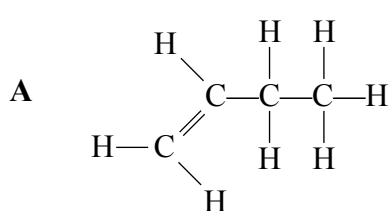
(Total 10 marks)

TOTAL FOR SECTION A: 45 MARKS



SECTION B

8. 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 structure is propene? (1)

(b) Hydrocarbon **D** forms a polymer. Draw a diagram to represent the structure of the polymer.

Structure of polymer

(2)

Q8

(Total 4 marks)



9. (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)

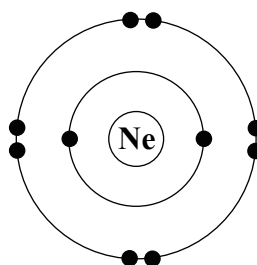
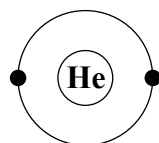
(ii) have the electronic configuration 2.8.4 (1)

(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)

Q9



10. 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)

Q10



11. 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 shell 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) Chlorine exists as two isotopes. Why do these isotopes have identical chemical properties?

..... (1)

(c) 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)

Q11

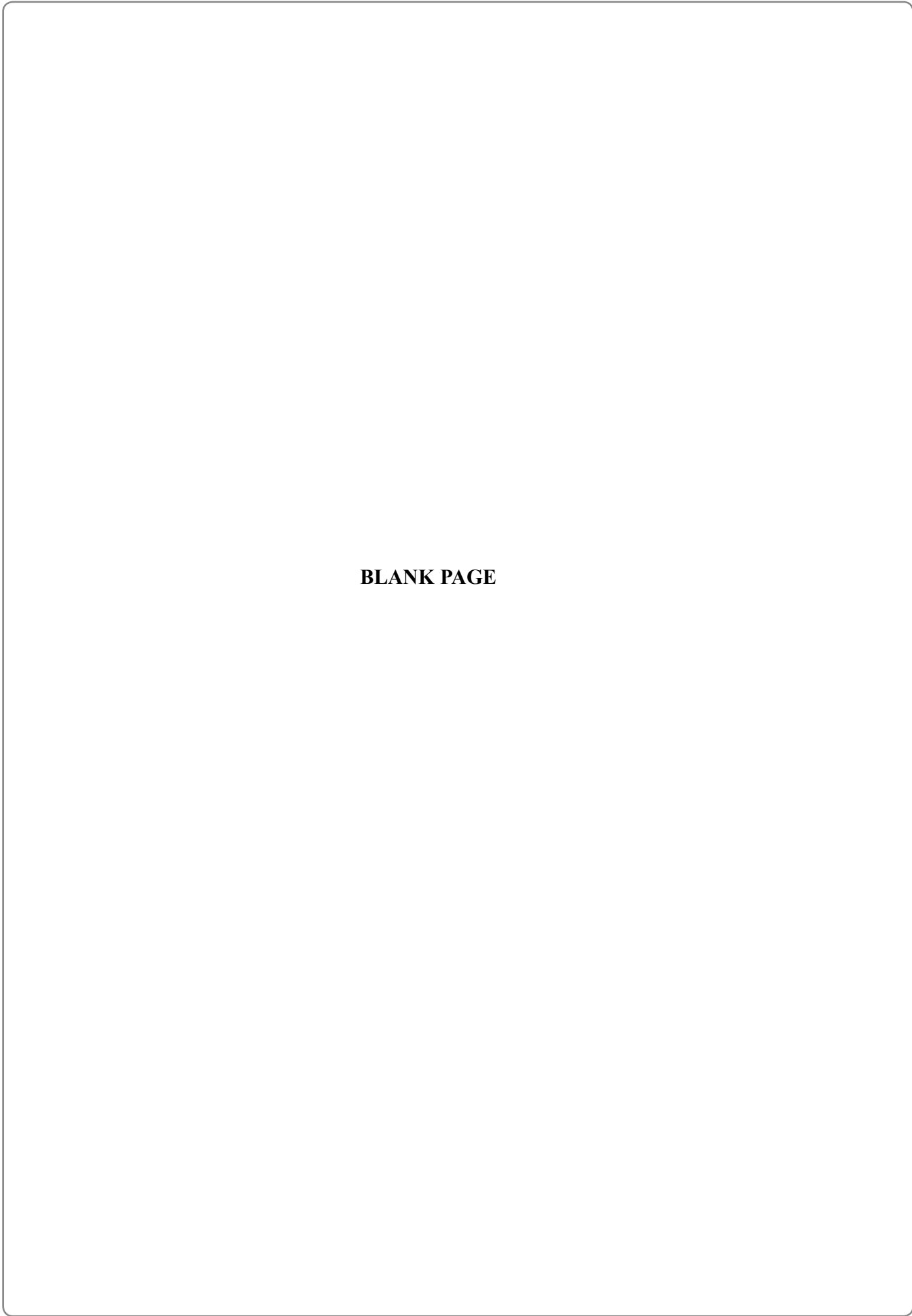
(Total 7 marks)

TOTAL FOR SECTION B: 30 MARKS

TOTAL FOR PAPER: 75 MARKS

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