

SECTION A

1. This question is about the Periodic Table on page 2.

(a) Tick (✓) **one** box to show the order in which elements are arranged in the Periodic Table.

- alphabetical
- atomic number
- reactivity
- relative atomic mass

(1)

(b) Which element has an atomic number that is the same as its relative atomic mass?

.....

(1)

(c) Which element is in both Period 3 and Group 4?

.....

(1)

(d) In Period 2, which element has atoms with the smallest number of neutrons?

.....

(1)

(e) How many metals are there in Period 3?

.....

(1)

Q1

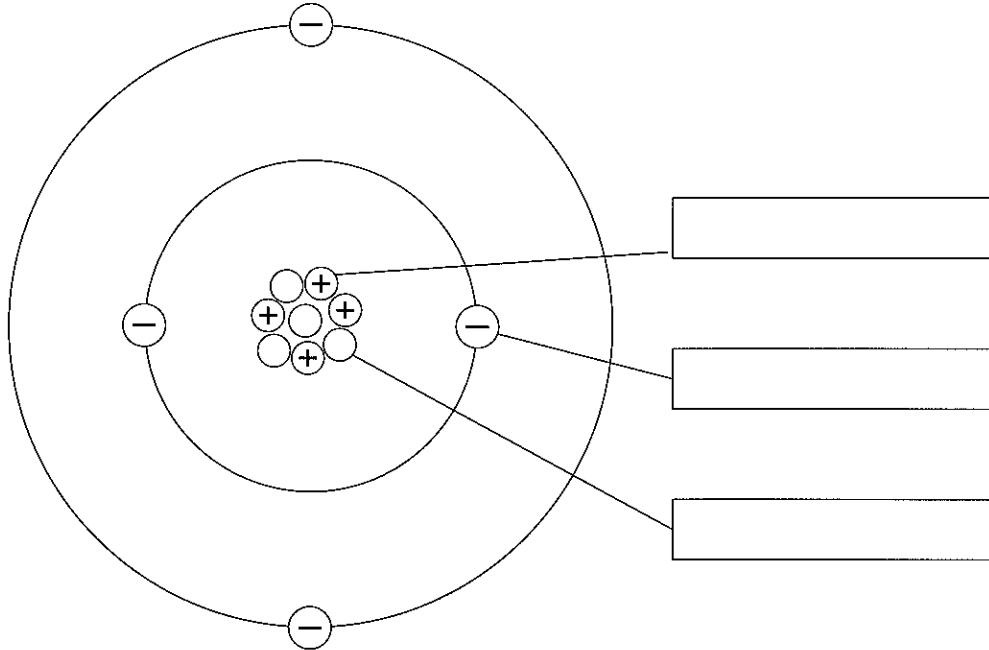
(Total 5 marks)



2. This question is about atoms.

(a) (i) Choose words from the box to label the diagram of an atom.

electron	ion
neutron	proton



(3)

(ii) What is the mass number of this atom?

..... (1)

(iii) Which element is composed of atoms like this? Use the Periodic Table on page 2.

..... (1)

(b) Chlorine has two isotopes. Give one way in which atoms of the two isotopes are

similar

.....

different

.....

(2)

(Total 7 marks)

Q2



3. A student adds small pieces of magnesium to dilute hydrochloric acid in a test tube. Hydrogen gas is produced.

(a) (i) What does the student **see** as the magnesium reacts?

..... (1)

(ii) The reaction is exothermic. What happens to the temperature of the acid during the reaction?

..... (1)

(iii) Write a word equation for the reaction.

..... (1)

(b) Describe the test for hydrogen.

Test

Result

(2)

(c) Tick (✓) **three** boxes to show how the student could make the reaction faster without changing the mass of the magnesium.

add water to the acid

cool the acid

increase the concentration of the acid

powder the magnesium before use

use a boiling tube instead of a test tube

use one large piece of magnesium

use warmer acid

(3)

Q3

(Total 8 marks)



4. (a) Complete the table to show whether each substance is an element or a compound and whether its particles are ionically or covalently bonded.

Name of substance	Element or compound	Bonding (ionic or covalent)
diamond	element	covalent
graphite	element	covalent
iodine		
magnesium oxide		
hydrogen chloride		

(4)

- (b) (i) Both diamond and graphite are forms of carbon. What is the name given to different forms of the same element in the same state?

.....
(1)

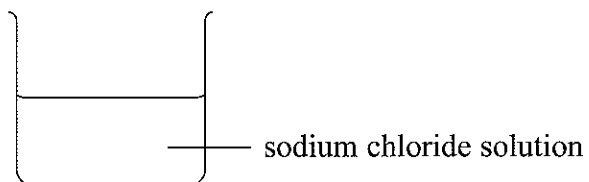
- (ii) Name another element that occurs in two different forms in the same state at room temperature.

.....
(1)



(c) Sodium chloride solution conducts electricity.

(i) Complete the diagram for an experiment to show this.



What will happen when a current flows through the solution?

.....
.....
(4)

(ii) What is the name given to solutions which conduct electricity?

.....
(1)

(Total 11 marks)

Q4

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5. The table gives the displayed formulae of some organic compounds.

Compound	Displayed formula
A	$ \begin{array}{cccc} \text{H} & & \text{H} & \text{H} \\ & & & \\ \text{C} & - & \text{C} & - & \text{C} & - & \text{C} & - & \text{H} \\ & & & & & & \\ \text{H} & & \text{H} & & \text{H} & & \text{H} \end{array} $
B	$ \begin{array}{cccc} & \text{H} & & \text{H} \\ & & & \\ \text{H} & - & \text{C} & - & \text{C} & - & \text{O} & - & \text{H} \\ & & & \\ & \text{H} & & \text{H} \end{array} $
C	$ \begin{array}{cccc} & \text{H} & & \text{H} \\ & & & \\ \text{H} & - & \text{C} & - & \text{C} & - & \text{H} \\ & & & \\ & \text{H} & & \text{H} \end{array} $
D	$ \begin{array}{cccc} & \text{H} & & \text{H} & & \text{H} & & \text{H} \\ & & & & & & & \\ \text{H} & - & \text{C} & - & \text{C} & = & \text{C} & - & \text{C} & - & \text{H} \\ & & & & & & & & \\ & \text{H} & & & & & & & \text{H} \end{array} $
E	$ \begin{array}{cccc} & \text{H} & & & & \text{H} & & \text{H} \\ & & & & & & & \\ \text{H} & - & \text{C} & - & \text{C} & - & \text{O} & - & \text{C} & - & \text{C} & - & \text{H} \\ & & & & & & & & & & \\ & \text{H} & & & \text{O} & & & & \text{H} & & \text{H} \end{array} $

(a) From the table select the letter(s) of

(i) **all** compounds that are hydrocarbons

..... (1)

(ii) **one** compound that is saturated

..... (1)

(iii) **two** compounds that are isomers of each other.

..... (1)



(b) Name the homologous series to which compound **A** belongs.

.....
(1)

(c) Give the general formula of the homologous series to which compound **C** belongs.

.....
(1)

(d) Describe a simple test to show the difference between compounds **A** and **C**.

Test

.....

Result with **A**

Result with **C**

(3)

(e) Compound **E** is an ester. Describe its smell.

.....
(1)

(f) Calculate the relative formula mass of compound **B**.

.....
(1)

(g) Substance **B** is ethanol. It can be made by reacting ethene with steam in the presence of a suitable catalyst.

(i) Write a chemical equation for the reaction.

.....
(1)

(ii) What catalyst is used in this reaction?

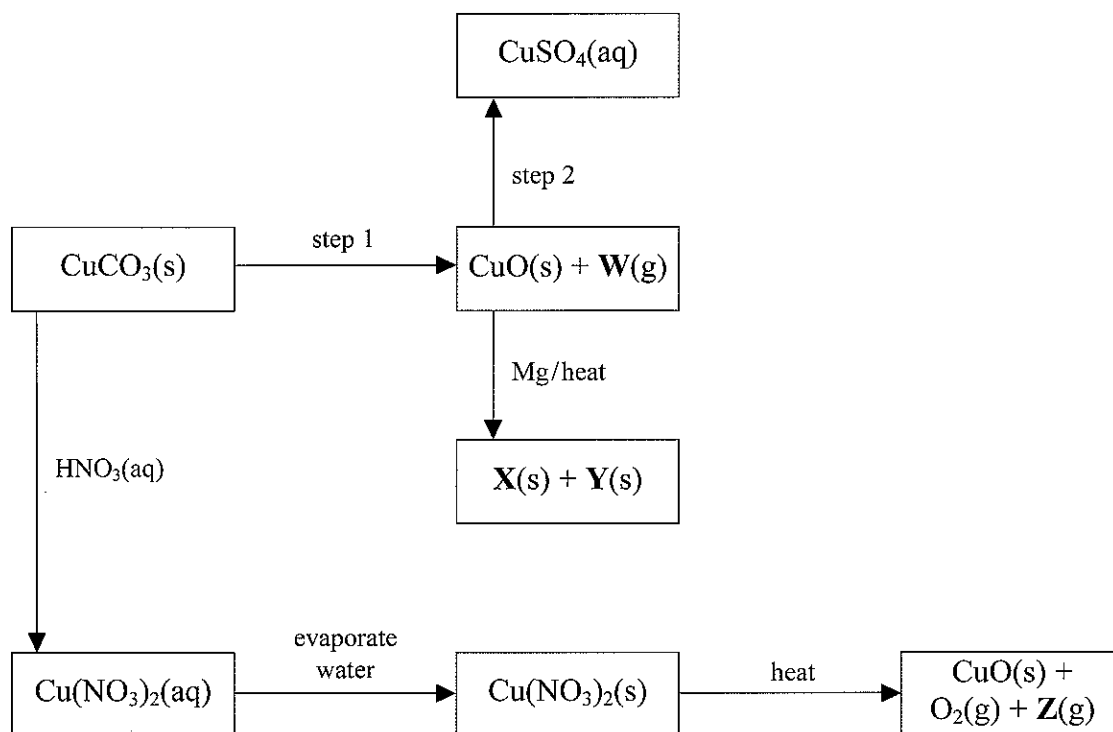
.....
(1)

(Total 12 marks)

Q5



6. The flow chart shows some reactions involving copper compounds.



(a) Give the meanings of the state symbols in the flow chart.

State symbol	Meaning
(aq)	
(g)	
(s)	

(3)

(b) (i) What are the conditions for step 1?

.....
(1)

(ii) What colour change would you see during step 1?

.....
(2)

(iii) Give the name of gas W which is made in step 1.

.....
(1)



(c) Give the name of the reagent which has the formula $\text{HNO}_3(\text{aq})$.

..... (1)

(d) Magnesium is more reactive than copper. When copper(II) oxide is heated with magnesium, substances **X** and **Y** are made. Identify **X** and **Y**.

X

Y

(2)

(e) A brown gas, **Z**, is produced when $\text{Cu}(\text{NO}_3)_2(\text{s})$ is heated. Give the name of **Z**.

..... (1)

(f) Identify the acid that reacts with CuO in step 2.

..... (1)

(Total 12 marks)

Q6

TOTAL FOR SECTION A: 55 MARKS



SECTION B

7. Some metals in Groups 1 and 2 of the Periodic Table react with cold water to form a solution of the metal hydroxide and a gas.

(a) How many electrons are in the outer shell of the atoms of the metals in Group 1 and Group 2?

Group 1

Group 2

(2)

(b) (i) Write a **word** equation for the reaction between sodium and water.

.....

(1)

(ii) Describe **two** observations that you could make during this reaction.

1

2

(2)

(c) Litmus is used to test for one of the products of this reaction.

(i) What type of substance is litmus?

.....

(1)

(ii) How does it show that this product is present?

.....

(1)



(d) Magnesium reacts very slowly with cold water but more quickly when it is heated in steam, forming an oxide instead of a hydroxide.

(i) Write a chemical equation for the reaction of magnesium with steam.

.....
(1)

(ii) What colour is the oxide formed?

.....
(1)

(e) The reactivities of sodium, potassium and magnesium are different.
State which of the three is the

most reactive

least reactive

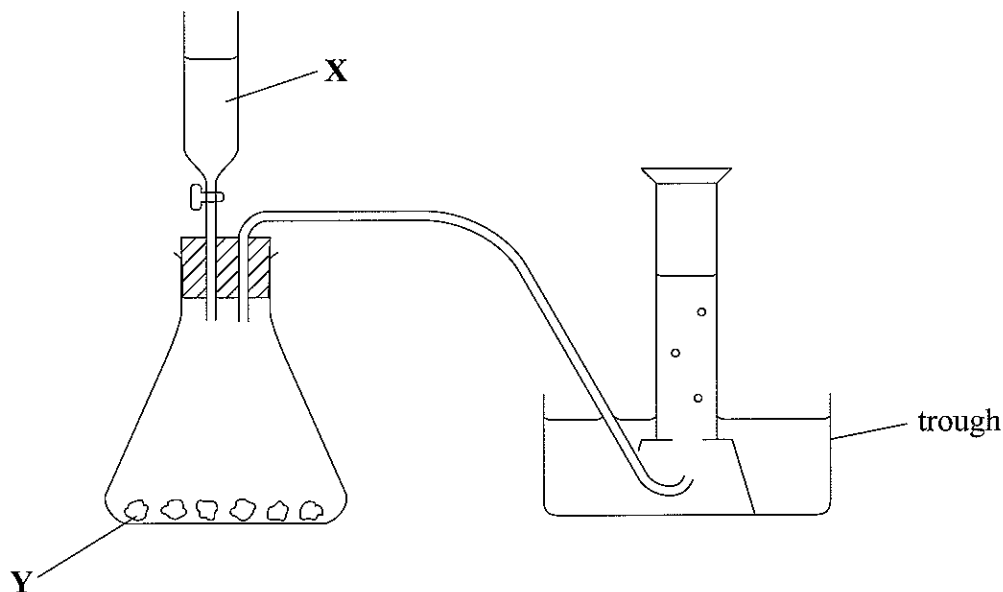
(2)

Q7

(Total 11 marks)



8. The diagram shows apparatus for preparing carbon dioxide gas in the laboratory.



(a) Calcium chloride and water are also products of this reaction. Identify the reactants X and Y.

X

Y

(2)

(b) The diagram shows carbon dioxide gas being collected over water. Suggest one other way to collect the gas.

.....

(1)



(c) By the end of the experiment the water in the trough is acidic. A sample is tested with universal indicator.

(i) State the colour of universal indicator at the end of the test.

.....
(1)

(ii) Name the acid formed in the water and give its formula.

Name

Formula

(2)

(iii) Define an acid in terms of proton transfer.

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

(d) The melting point of calcium chloride is very much higher than that of water. State the type of bonding in

calcium chloride

water

(2)

(e) State one industrial use of carbon dioxide.

.....
(1)

(f) Explain why carbon dioxide used in industry is **not** obtained from air.

.....
(1)

(Total 11 marks)

Q8



9. Crude oil is a source of useful chemicals.

(a) Complete the sentence.

Most of the compounds in crude oil are composed of the elements

..... and (1)

(b) During refining, crude oil is first separated into fractions.

(i) What is the name of the process used to obtain fractions from crude oil?

..... (1)

(ii) What is meant by the term **fraction**?

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

(iii) Describe how the fractions are obtained.

.....
.....
.....
.....
.....
.....
..... (3)



(c) Four of the fractions obtained from crude oil are

- diesel
- fuel oil
- gasoline
- kerosene

(i) Which of these four fractions catches fire most easily?

..... (1)

(ii) Which of these four fractions is least volatile?

..... (1)

(iii) Name two other fractions obtained from crude oil.

- 1
 - 2
- (2)

(d) Many substances obtained from the fractions are used as fuels. It is important that the combustion of fuels is complete.

(i) Name the gas produced when combustion is **incomplete**.

..... (1)

(ii) Explain why this gas can be dangerous.

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

(Total 13 marks)

Q9



10. Aluminium is extracted from its oxide by electrolysis.

(a) Give two reasons why cryolite is used in the electrolysis of aluminium oxide.

- 1
-
- 2
-
- (2)

(b) The same material is used for both the positive and negative electrodes.

(i) What is this material?

.....

(1)

(ii) Which gas is produced by electrolysis at the positive electrodes?

.....

(1)

(iii) Explain why these electrodes are replaced at regular intervals.

.....

(1)

(c) Explain why aluminium cannot be extracted using coke in a blast furnace.

.....

.....

(1)

(d) State **one** major cost involved in the extraction of aluminium but **not** in the extraction of iron.

.....

(1)



(e) The uses of aluminium are related to its properties. Complete the table by giving a **different** property for each use.

Use	Property
aeroplanes	
drinks cans	easily moulded
overhead power cables	
pans for cooking food	

(3)

Q10

(Total 10 marks)

TOTAL FOR SECTION B: 45 MARKS

TOTAL FOR PAPER: 100 MARKS

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