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SECTION A

1. Look at the Periodic Table on page 2.

(a) Give the symbol of the element that has the atomic number of 12.

.....
(1)

(b) Give the symbol of the element that has a relative atomic mass of 12.

.....
(1)

(c) Give the number of the group that contains the noble gases.

.....
(1)

(d) Which group contains elements whose atoms form ions with a 2+ charge?

.....
(1)

(e) Which group contains elements whose atoms form ions with a 1- charge?

.....
(1)

(Total 5 marks)

Q1



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2. Atoms contain three types of particle: proton, neutron and electron.

(a) Where in the atom are the protons and neutrons?

.....
(1)

(b) Which type of particle in the atom is in orbits (shells)?

.....
(1)

(c) Which **one** of the particles has a positive charge?

.....
(1)

(d) Which **two** particles have approximately the same mass?

.....
(1)

(e) What name is given to atoms of the same element which contain different numbers of neutrons?

.....
(1)

Q2

(Total 5 marks)



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3. A piece of iron is left in damp air for some time.
A brown layer forms on the iron.

(a) Name the **two** substances in damp air that react with the iron.

1

2

(2)

(b) What is the brown layer?

.....

(1)

(c) The reaction between iron and damp air can be prevented by covering the iron with another material. Name **two** materials that can be used.

1

2

(2)

Q3

(Total 5 marks)

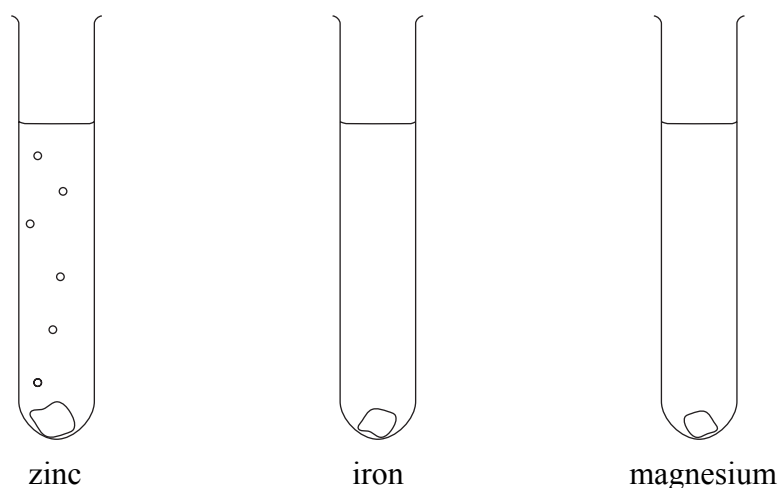


4. The reactivity of metals can be compared by their reactions with dilute hydrochloric acid.

Three different metals are added to separate test tubes containing this acid.

The diagram shows bubbles of hydrogen gas forming when a piece of zinc is added to dilute hydrochloric acid.

(a) Complete the diagram to show the bubbles forming in the other two test tubes.



(2)

(b) Write a word equation for the reaction between zinc and dilute hydrochloric acid.

..... (1)

(c) Name **one** metal that does not form bubbles when it is added to dilute hydrochloric acid.

..... (1)

(d) Identify **two** substances, other than acids, that can be used in reactions to compare the reactivity of metals.

1

2

(2)

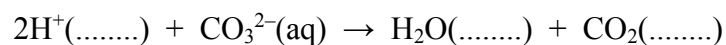
Q4

(Total 6 marks)



5. A student tests a solution to see if it contains CO_3^{2-} ions.

The first part of this test involves this reaction:



(a) One state symbol is given in the equation. Write the other state symbols in the spaces provided. (3)

(b) **Name** a reagent that can be used to provide the H^+ ions in the reaction.

..... (1)

(c) Give the name for each of the following formulae:

CO_3^{2-}

CO_2 (2)

(d) The second part of the test involves using $\text{Ca}(\text{OH})_2$ to detect the CO_2 .

(i) What is the chemical name for $\text{Ca}(\text{OH})_2$?

..... (1)

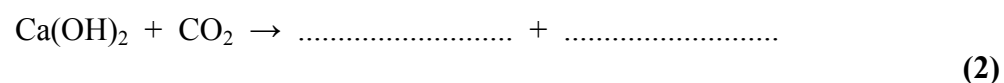
(ii) The $\text{Ca}(\text{OH})_2$ is dissolved in water to make a solution when doing the test for CO_2 . What is the common name for this solution?

..... (1)

(iii) What is **seen** during this test for CO_2 ?

..... (1)

(iv) Complete the chemical equation for the reaction between these two substances.



(e) CO_2 is present in air. What effect does it have on rain water?

..... (1)

(Total 12 marks)

Q5

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6. Crude oil is a mixture of hydrocarbons.

(a) Which **two** elements are present in the compounds in crude oil?

..... and
(2)

(b) Crude oil is separated into fractions by heating and passing the vapour into a fractionating column. Explain why the fractions separate in the column.

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

(c) Two of the fractions are gasoline and bitumen. Give **one** use of each.

Use of gasoline

Use of bitumen

(2)

(d) Name **two** fractions formed in the fractional distillation of crude oil, other than gasoline and bitumen.

1

2

(2)

(e) (i) Identify the **two** products of **complete** combustion of hydrocarbons.

1

2

(2)

(ii) Explain why the **incomplete** combustion of hydrocarbons is harmful to humans.

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

(Total 12 marks)

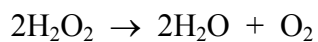
Q6

TOTAL FOR SECTION A: 45 MARKS



SECTION B

7. Hydrogen peroxide decomposes into water and oxygen.

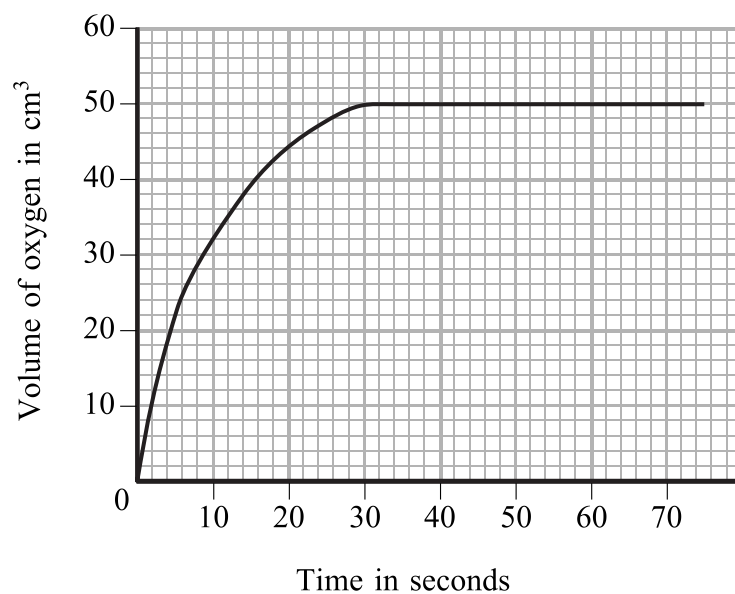


The reaction is very slow but becomes faster if manganese(IV) oxide is added. The manganese(IV) oxide does not get used up during the reaction.

(a) What is the role of the manganese(IV) oxide in this reaction?

.....
(1)

(b) The graph shows how the volume of oxygen collected changed with time when 1 g of small lumps of manganese(IV) oxide were added to 10 cm³ of hydrogen peroxide.



Sketch on the axes above the results obtained when

(i) the experiment is repeated using 1 g of powdered manganese(IV) oxide.
 Label this sketch **A**. **(2)**

(ii) the same volume of hydrogen peroxide is used but 5 cm³ of water is added to it before the manganese(IV) oxide is added.
 Label this sketch **B**. **(2)**

(c) Describe a test for oxygen gas.

Test

Result

(2)

Q7

(Total 7 marks)



8. The decomposition of ammonium chloride is a reversible reaction.

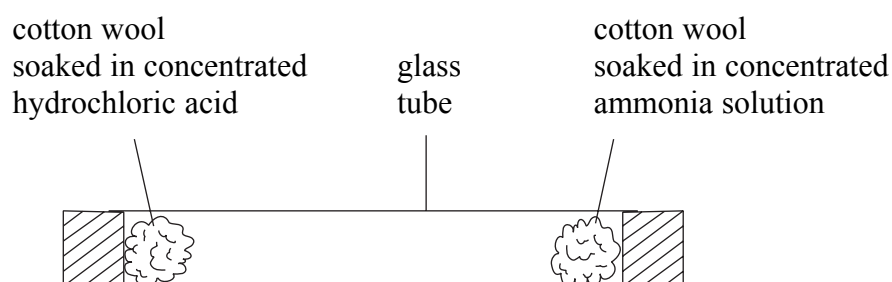


(a) How is this reaction made to go in the **forward** direction?

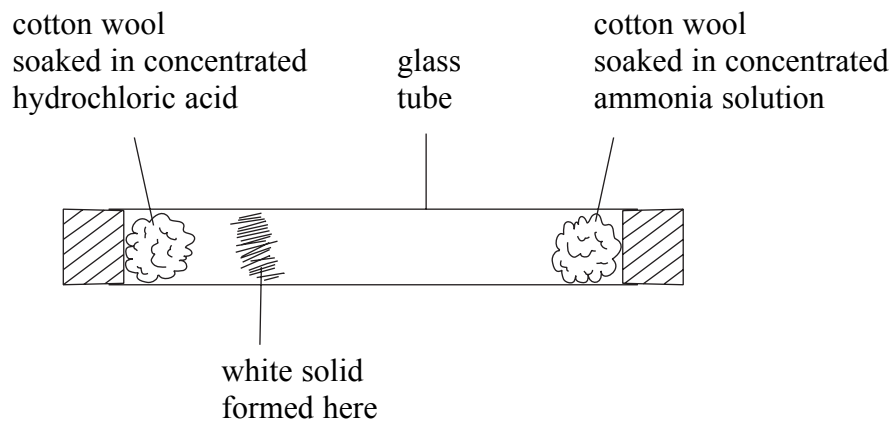
.....
(1)

(b) Concentrated hydrochloric acid gives off hydrogen chloride gas.
 Concentrated ammonia solution gives off ammonia gas.

An experiment is set up.



After a few minutes a white solid forms inside the tube. The solid forms when ammonia gas reacts with hydrogen chloride gas.



(i) Name the process by which the ammonia and hydrogen chloride particles move inside the tube.

.....
(1)

(ii) What is the white solid that forms inside the tube?

.....
(1)



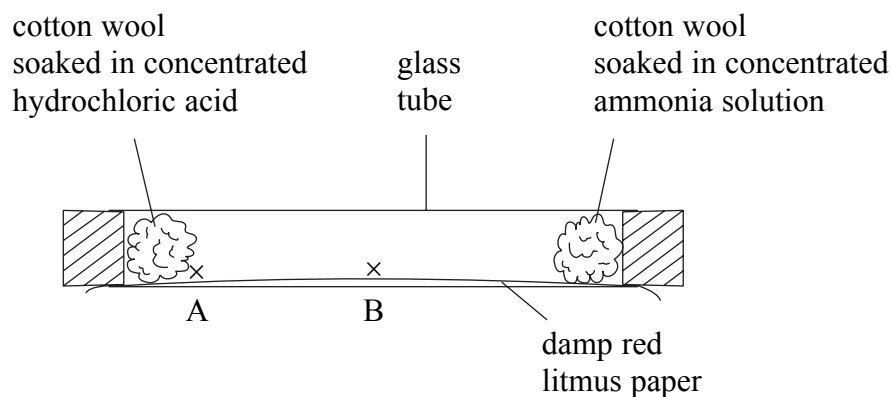
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(iii) What does the position of the white solid tell you about the relative speeds at which the ammonia and hydrogen chloride particles move?

.....
.....

(1)

(iv) The experiment is repeated with a strip of damp red litmus paper placed along the inside of the tube.



State the colour of the litmus paper at A and B when the white solid forms.

A

B

(2)

Q8

(Total 6 marks)



9. The alkenes are a **homologous series** of **unsaturated** hydrocarbons.

(a) (i) Tick **two** boxes that are correct statements about members of an homologous series.

They have similar chemical properties

They have the same displayed formula

They have the same general formula

They have the same physical properties

They have the same relative formula masses

(2)

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

.....
.....

(1)

(b) Alkenes react with bromine water. Ethene is the simplest alkene.

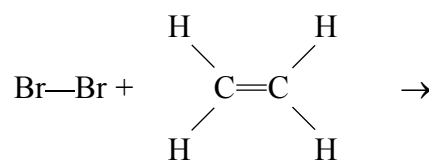
(i) Bromine water is added to ethene. State the starting and finishing colours of the reaction mixture.

Colour at start

Colour at finish

(2)

(ii) Complete the equation by drawing the displayed formula of the product.



(1)



(c) Isomers are compounds that have the same molecular formula but different displayed formulae.

Draw the displayed formulae of **two** isomers that have the molecular formula C_4H_8 .

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(2)

Q9

(Total 8 marks)



10. Sodium is a very reactive metal. It floats on water and reacts rapidly with water.

A small piece of sodium is placed in a trough of water. A reaction takes place and hydrogen gas is given off.

(a) (i) Give **two** observations, other than the sodium floating, that you could make during the reaction.

1

2

(2)

(ii) Write a word equation for the reaction.

.....

(1)

(iii) Universal indicator is added to the water in the trough. State what colour it turns and explain why.

Colour

Explanation

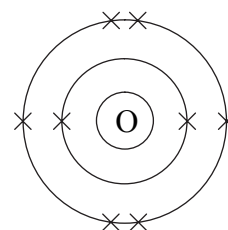
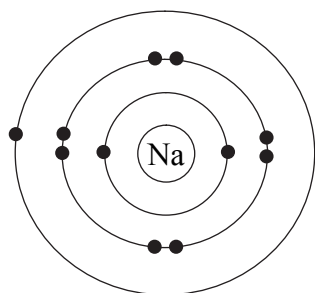
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(2)



(b) A piece of sodium is heated in a Bunsen flame. The sodium catches fire and reacts with the oxygen in the air. The product is sodium oxide.

(i) The diagrams show the electron arrangement in an atom of sodium and an atom of oxygen.



Sodium oxide contains ionic bonds. Describe what happens, in terms of electrons, when sodium reacts with oxygen.

.....

.....

.....

.....

.....

.....

(3)

(ii) What is the chemical formula of the sodium oxide made in this reaction?

.....

(1)

Q10

(Total 9 marks)

TOTAL FOR SECTION B: 30 MARKS

TOTAL FOR PAPER: 75 MARKS

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