

THE PERIODIC TABLE

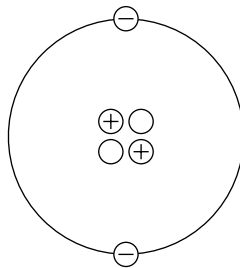
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	1	2	3	4	5	6	7	0														
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1	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">1 H Hydrogen 1</td> <td style="width: 50%; text-align: center;">4 He Helium 2</td> </tr> </table>							1 H Hydrogen 1	4 He Helium 2													
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2	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">7 Li Lithium 3</td> <td style="width: 50%; text-align: center;">9 Be Beryllium 4</td> </tr> </table>	7 Li Lithium 3	9 Be Beryllium 4		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">11 Na Sodium 11</td> <td style="width: 50%; text-align: center;">12 Mg Magnesium 12</td> </tr> </table>	11 Na Sodium 11	12 Mg Magnesium 12	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">19 K Potassium 19</td> <td style="width: 50%; text-align: center;">20 Ca Calcium 20</td> </tr> </table>	19 K Potassium 19	20 Ca Calcium 20	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">27 Co Cobalt 27</td> <td style="width: 50%; text-align: center;">28 Ni Nickel 28</td> </tr> </table>	27 Co Cobalt 27	28 Ni Nickel 28	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">35 Br Bromine 35</td> <td style="width: 50%; text-align: center;">36 Kr Krypton 36</td> </tr> </table>	35 Br Bromine 35	36 Kr Krypton 36	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">53 I Iodine 53</td> <td style="width: 50%; text-align: center;">54 Xe Xenon 54</td> </tr> </table>	53 I Iodine 53	54 Xe Xenon 54	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">85 At Astatine 85</td> <td style="width: 50%; text-align: center;">86 Rn Radon 86</td> </tr> </table>	85 At Astatine 85	86 Rn Radon 86
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7																						

Relative atomic mass
Symbol
Name
Atomic number



SECTION A

1. The diagram shows the structure of an atom.



(a) What name is used for the central part of an atom?

..... (1)

(b) What is the name of the positively charged particle?

..... (1)

(c) What is the name of the particle shown as \ominus ?

..... (1)

(d) What is the atomic number of this element?

..... (1)

(e) Look at the Periodic Table opposite. What is the name of this element?

..... (1)

(Total 5 marks)

Q1

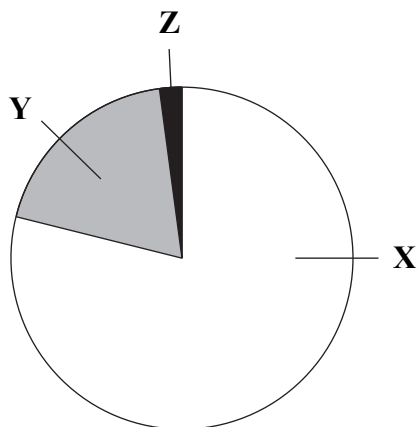


N 2 3 0 5 1 A 0 3 2 4

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2. The pie chart shows the approximate percentages by volume of gases in dry air.



(a) Which part of the pie chart (X, Y or Z) represents nitrogen?

..... (1)

(b) What is the approximate percentage of oxygen in dry air?

..... (1)

(c) What is the test for oxygen gas?

Test

Result

(2)

(d) Name the gas in dry air that is formed by the complete combustion of methane, CH₄.

..... (1)

(Total 5 marks)

Q2



3. A teacher described a reaction as follows:

“When zinc is added to dilute sulphuric acid, hydrogen gas and a zinc compound are formed.”

(a) Write a **word** equation for this reaction.

.....
.....

(1)

(b) A student added a piece of zinc to a test tube containing dilute sulphuric acid.

Use words from the box to complete an account of the reaction.

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

effervescence	endothermic	exothermic
faster	precipitation	slower

- After adding the zinc to the acid the student saw
- After a few minutes the student noticed that the reaction was than at the start.
- The test tube was warmer at the end of the reaction than at the start. This showed that the reaction was

(3)

(c) Describe a test the student could use to show that the gas formed was hydrogen.

Test

Result

(2)



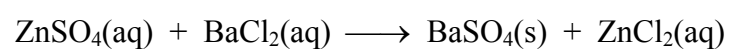
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(d) At the end of the reaction there was some solid zinc left in the test tube. The student removed the zinc, leaving a colourless solution of zinc sulphate.

(i) Which technique did the student use to remove the zinc at the end of the reaction?

.....
(1)

(ii) The student asked the teacher how to test the colourless solution to find out if it contained sulphate ions. The teacher wrote this equation:



State the name of the compound added to the colourless solution.

.....

Describe what the student would see.

.....
.....

(2)

Q3

(Total 9 marks)



4. (a) Iron is extracted from iron oxide in a blast furnace.

(i) Name the two solid raw materials added to the top of the blast furnace with the iron oxide.

Raw material 1

Raw material 2.....

(2)

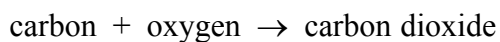
(ii) Molten iron collects at the bottom of the furnace.

Which molten substance collects above molten iron?

.....

(1)

(iii) The word equation for one reaction that occurs in the blast furnace is

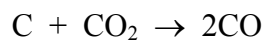


Write the chemical equation for this reaction, including state symbols.

.....

(2)

(iv) The chemical equation for another reaction that occurs in the blast furnace is



Which substance in this equation is reduced?

.....

(1)



Leave
blank

(b) After some time, rust forms on many objects made from iron.

(i) Name **two** substances needed for rust to form on iron.

Substance 1

Substance 2

(2)

(ii) Iron buckets can be prevented from rusting by galvanising. In this process the iron bucket is coated with another metal.

Name the metal used to galvanise iron. Describe how this metal prevents the iron from rusting.

Name of metal

Description

.....

(2)

(iii) Suggest why the iron inside a motor car engine does not rust.

.....

.....

(1)

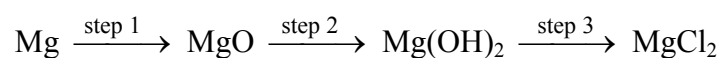
(Total 11 marks)

Q4

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5. The element magnesium and some of its compounds appear in the following reaction scheme.



- (a) Describe **two** observations that can be made when magnesium is heated in air in step 1.

Observation 1

Observation 2

(2)

- (b) What substance is added to magnesium oxide in step 2?

.....

(1)

- (c) Some magnesium hydroxide is mixed with water. The pH value of the solution formed is measured.

Draw a ring round the most likely pH value of the solution.

1 3 7 11 14

Give a reason for your choice.

.....

(2)



Leave
blank

(d) Indigestion can be caused by excess acid in the stomach.
Some medicines taken for indigestion contain magnesium hydroxide.
The reaction in step 3 occurs when magnesium hydroxide reacts with the acid in the stomach.

(i) Name the acid which reacts in step 3.

.....
(1)

(ii) Name the type of reaction that occurs in step 3.

.....
(1)

(iii) State the other product of the reaction in step 3.

.....
(1)

(Total 8 marks)

Q5



6. The molecular formulae of four organic compounds, **A**, **B**, **C** and **D**, are shown below.



(a) Explain why all four compounds are hydrocarbons.

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

(b) Compounds in the same homologous series have the same general formula.

(i) State the name of the homologous series to which compound **C** belongs.

.....
(1)

(ii) Put a ring round the general formula of this homologous series.



(iii) State which of the compounds **A**, **B** and **D** are members of the same homologous series as **C**.

.....
(1)

(c) (i) Explain the term **isomers**.

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

(ii) State which, if any, of the four compounds have isomers.

.....
(1)



Leave
blank

(d) Draw a displayed formula of a molecule of **B** showing the arrangement of the bonds around the carbon atoms.

(2)

(e) Calculate the relative formula mass of **B** using information from the Periodic Table.

.....

.....

(1)

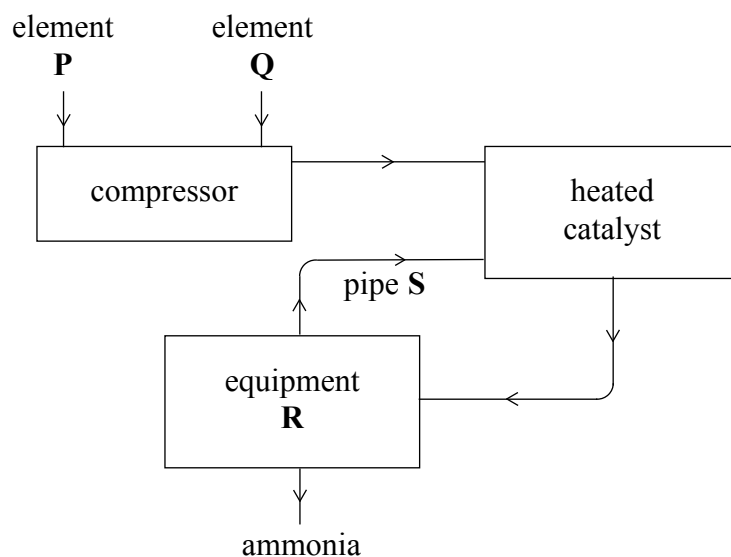
(Total 10 marks)

Q6

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7. The flow diagram represents the manufacture of ammonia by the Haber process.



(a) Name elements **P** and **Q** and state one source of each.

Name of **P**

Source of **P**

Name of **Q**

Source of **Q**

(4)

(b) (i) What happens to the mixture of gases entering equipment **R**?

.....

(1)

(ii) In what physical state is the ammonia obtained?

.....

(1)

(c) What flows through pipe **S**?

.....

(1)

(Total 7 marks)

Q7

TOTAL FOR SECTION A: 55 MARKS



SECTION B

8. (a) The table gives the names of some compounds. Place ticks (✓) in the table to show the type of bonding in each compound and whether it is soluble or insoluble in water. Each row should have two ticks. Some ticks have already been done for you.

Name of compound	Ionic bonding	Covalent bonding	Insoluble in water	Soluble in water
ammonia				
methane			✓	
poly(ethene)		✓		
sodium chloride				
sodium hydroxide	✓			✓

(4)

- (b) All the substances listed are very useful.

- (i) Give **one** use of poly(ethene).

.....
(1)

- (ii) Name **two** products that are made using sodium hydroxide.

Product 1

Product 2

(2)

Q8

(Total 7 marks)



Leave
blank

9. This question is about chlorine.

(a) Give the name of a substance that reacts with hydrochloric acid to produce chlorine gas.

.....
(1)

(b) Describe the test for chlorine.

Test

Result

(2)

(c) Chlorine gas reacts with iron to form a solid.

(i) Give the name of this solid.

.....
(1)

(ii) When this solid is dissolved in water a yellow solution is formed. State what you see when sodium hydroxide solution is added to this yellow solution.

.....
(1)

(d) When chlorine gas is bubbled through colourless potassium iodide solution a brown solution is formed.

(i) Name the substance that makes the solution brown.

.....
(1)

(ii) What does this reaction show about the reactivity of chlorine compared with that of iodine?

.....
(1)

(Total 7 marks)

Q9

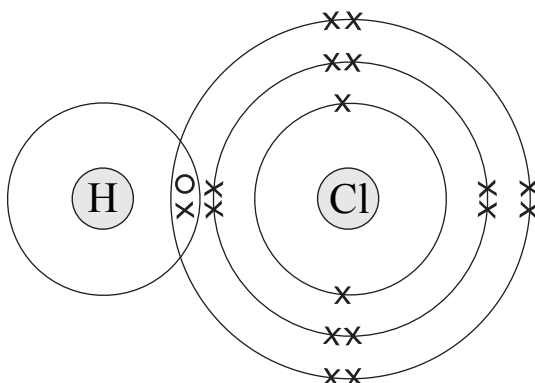


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10. This question is about two covalently bonded compounds.

(a) The dot and cross diagram shows the covalent bonding in a hydrogen chloride molecule.



What is a covalent bond?

.....
(1)

(b) Use words from the box to complete the sentences about hydrogen chloride. Each word may be used once, more than once or not at all.

giant	high	ions	low
molecules	simple	strong	weak

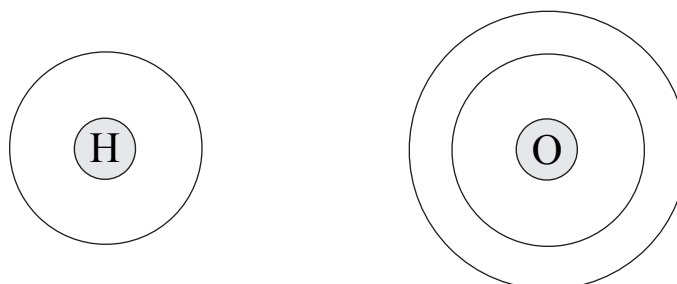
Hydrogen chloride has a molecular structure.

There are forces between the

Because of this, hydrogen chloride has a boiling point.

(4)

(c) (i) Use the Periodic Table to help you complete the diagrams to show the electronic configuration of hydrogen and of oxygen.



(2)



Leave
blank

(ii) Draw a dot and cross diagram to show the covalent bonding in a water molecule.

(2)

(iii) State the shape of a water molecule.

.....

(1)

Q10

(Total 10 marks)

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11. The table gives the electronic configuration of three different atoms.

Atom	Electronic configuration
fluorine	2.7
magnesium	2.8.2
sodium	2.8.1

(a) Describe the electron transfers that take place when magnesium reacts with fluorine to make the ionic compound magnesium fluoride, MgF_2 . You may use diagrams to help your answer.

.....

.....

.....

.....

.....

(3)

(b) In this reaction both oxidation and reduction have occurred. State which element has been oxidised, giving a reason.

.....

.....

(2)

(c) (i) Give the symbols of the ions formed by sodium and fluorine.

.....

(1)

(ii) Give the formula of sodium fluoride.

.....

(1)

(d) A flame test is carried out on separate samples of magnesium fluoride and sodium fluoride.

The magnesium fluoride does not colour the flame.

What colour do you see when the sodium fluoride is tested?

.....

(1)

Q11

(Total 8 marks)



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12. The table gives the colours of some indicators at different pH values.

Indicator	pH							
	1	3	5	7	9	11	13	
litmus	← red →			purple	← blue →			
phenolphthalein	← colourless →					← pink →		
methyl orange	← red →		← yellow →					

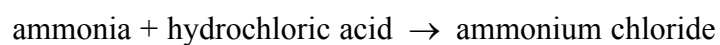
- (a) (i) Use the table to find the pH of a solution in which litmus is red **and** methyl orange is yellow.

.....
(1)

- (ii) Litmus is purple in sodium chloride solution. What colour is phenolphthalein in sodium chloride solution?

.....
(1)

- (b) A student was investigating the neutralisation of aqueous ammonia using hydrochloric acid.
She placed 25 cm³ of aqueous ammonia in a conical flask and added a few drops of litmus.
She then slowly added hydrochloric acid to the mixture in the flask.
The indicator turned purple after she had added 15 cm³ of hydrochloric acid.
The word equation for the reaction is



- (i) Write a chemical equation for the reaction of ammonia with hydrochloric acid.

.....
(2)



Leave blank

(ii) Describe a chemical test to show that the solution obtained contains ammonium ions. Give the result of the test.

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

(3)

(iii) The student used the same original solutions of aqueous ammonia and hydrochloric acid to make a pure sample of ammonium chloride crystals. Describe how she could do this.

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

(3)

(c) (i) Lead(II) chloride is insoluble. Name two solutions that react together to make lead(II) chloride.

First solution

Second solution

(2)

(ii) Write a **word** equation for this reaction.

.....
.....

(1)

Q12

(Total 13 marks)

TOTAL FOR SECTION B: 45 MARKS

END

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