

THE PERIODIC TABLE

	Group																															
Period	1	2	3	4	5	6	7	0																								
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	1						2																									
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223	Fr						Og																									
	Francium						Oganesson																									
	87						118																									

Key

Relative atomic mass
Symbol
Name
Atomic number



SECTION A

1. Iron is a metal which can rust.

(a) Name the **two** substances that must be present for iron to rust.

1

2

(2)

(b) The table gives three methods of preventing rusting. Choose words from the box to complete the table. Each word may be used only once, or not at all.

bicycle chain bridge
bucket car body
food can

Method of preventing rusting	Example of where used
galvanising	
oiling	
painting	

(3)

(c) In galvanising, iron is coated with another metal. Name this metal.

.....

(1)

(Total 6 marks)

Q1



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blank

2. (a) The table shows different methods of separating mixtures. Tick (✓) **one** box in each row to show the best method for each mixture.

Mixture \ Method	Filtration	Distillation	Chromatography	Fractional distillation
different coloured inks				
sand and water				
ethanol and water				
copper(II) sulphate and water				

(4)

- (b) State a simple physical test to show that a sample of water is pure. Give the result of the test.

Test

Result

(2)

Q2

(Total 6 marks)



3. This question is about atoms and the Periodic Table.

(a) In which part of an atom are protons and neutrons found?

.....
(1)

(b) Which particle in an atom has a negative charge?

.....
(1)

(c) Which particle in an atom has the lowest mass?

.....
(1)

(d) (i) The table gives some information about different atoms. Complete the table.

Atom	Mass number	Atomic number	Number of protons	Number of neutrons	Number of electrons
W	35	17	17		17
X		11	11	12	11
Y	39		19	20	19
Z	37	17	17	20	

(4)

(ii) From the table select

- two atoms which are isotopes of the same element

.....

- two atoms of different elements which are in the same period.

.....

(2)

QUESTION 3 CONTINUES ON PAGE 6



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blank

(iii) Give the electronic configuration of atom X.

.....
(1)

(e) Bromine is in Group 7 of the Periodic Table. Each bromine atom has 7 electrons in its outer shell.

Iodine is directly below bromine in the Periodic Table. How many electrons does an atom of iodine have in its outer shell?

.....
(1)

Q3

(Total 11 marks)



4. (a) Crude oil is a mixture of many different compounds.

(i) Place ticks (✓) in the boxes next to the names of **three** substances that can be obtained **directly** from crude oil.

bitumen

ethanoic acid

ethanol

gasoline

graphite

kerosene

(3)

(ii) What process is used to separate the compounds in crude oil?

.....
(2)

(b) Draw the displayed formula of ethene.

(1)

(c) When bromine water is added to ethene a reaction occurs. What colour change is seen?

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

(d) (i) Give the name of the polymer formed from ethene.

.....
(1)

(ii) What type of polymer is this?

.....
(1)

(iii) Give **one** use of this polymer.

.....
(1)

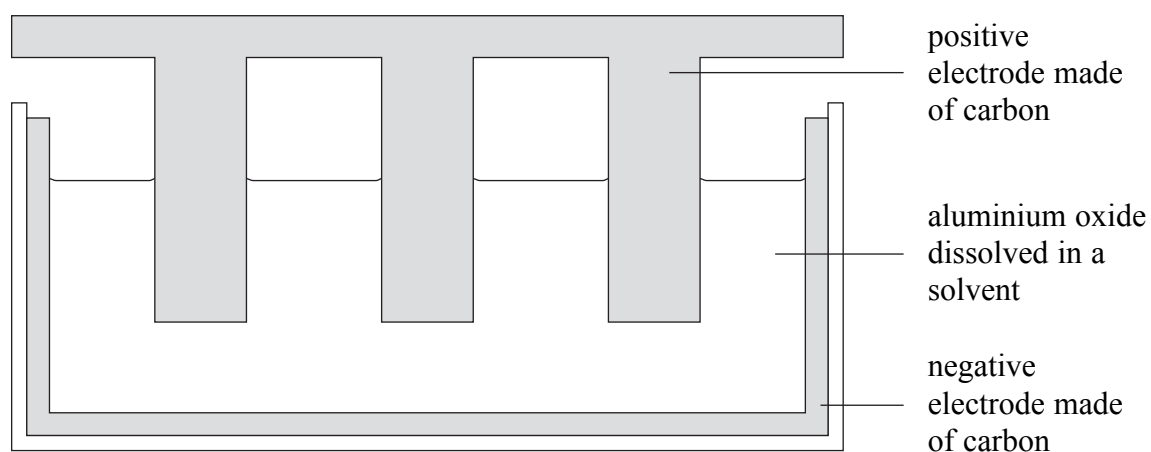
(Total 11 marks)

Q4

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5. (a) Aluminium is extracted from aluminium oxide by electrolysis. The diagram shows a cross-section through an electrolysis cell.



- (i) Name the solvent used.

..... (1)

- (ii) The positive and negative electrodes are made of carbon. What property of carbon makes it suitable for this purpose?

..... (1)

- (iii) The positive electrodes need to be replaced regularly. This is because they react with one of the products of the electrolysis.

Which product reacts with the positive electrodes?

.....

What substance is formed during this reaction?

..... (2)



(b) Iron is obtained from iron(III) oxide using carbon monoxide, CO, as the reducing agent.

(i) Complete the word equation.

iron(III) oxide + carbon monoxide → +
(1)

(ii) Why is the conversion of iron(III) oxide into iron described as reduction?

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

(c) Place ticks (✓) in **two** boxes to indicate two similarities between the extraction of iron and the extraction of aluminium.

both produce carbon dioxide

both produce liquid metal

both produce slag

both produce the metal in a pure form

both use a lot of electricity

(2)

(d) Iron(III) oxide reacts with carbon. Aluminium oxide does not react with carbon. Which of the three elements aluminium, carbon or iron is the most reactive?

.....
(1)

(e) Give **one** large-scale use of iron and **one** large-scale use of aluminium.

Iron

Aluminium

(2)

Q5

(Total 11 marks)

--	--



6. This question is about sulphuric acid and substances made using sulphuric acid.

(a) Place ticks (✓) in the boxes next to the **three** statements that are correct.

sulphuric acid can lose protons (H⁺ ions)

sulphuric acid has a pH value of more than 7

sulphuric acid has the formula H₂SO₄

sulphuric acid reacts with copper(II) carbonate to form hydrogen gas

sulphuric acid turns phenolphthalein pink

sulphuric acid turns red litmus blue

sulphuric acid turns universal indicator red

(3)

(b) A teacher gives the following instructions for making hydrated copper(II) sulphate crystals.

*Place 50 cm³ of dilute sulphuric acid in a beaker.
Add a spatula full of copper(II) carbonate to the acid and stir.
Continue to add copper(II) carbonate until all the acid has reacted.
Filter the mixture into an evaporating dish.
Evaporate the filtrate until the crystallisation point.
Leave the evaporating dish to cool.
Dry the crystals using filter paper.*

(i) How can you tell when all the acid has reacted?

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

(ii) Why is the mixture filtered?

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

(iii) Give the names of the **two** substances in the filtrate.

1

2

(2)



Leave
blank

(c) A student follows the instructions but heats the evaporating dish until all the water has gone. He has made anhydrous copper(II) sulphate. His teacher tells him to add water to the anhydrous solid to make hydrated copper(II) sulphate.

(i) What colour change does he see as he adds the water?

.....
.....

(2)

(ii) What is the name given to reactions which can go in either direction?

.....

(1)

Q6

(Total 10 marks)

TOTAL FOR SECTION A: 55 MARKS



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SECTION B

7. The starting material in the manufacture of sulphuric acid is sulphur.

(a) Give **two** sources of sulphur.

1

2

(2)

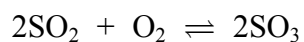
(b) Give **two** other raw materials used in the process.

1

2

(2)

(c) The equation for one of the reactions involved in the contact process is



(i) What is the name of the product of this reaction?

.....

(1)

(ii) State **two** conditions used in this reaction.

1

2

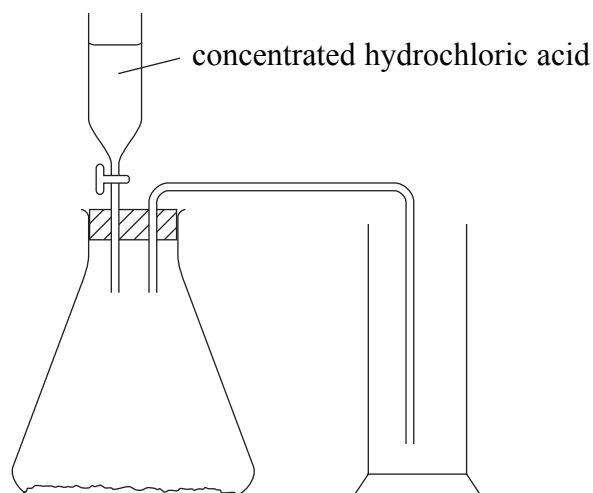
(2)

(Total 7 marks)

Q7



8. The diagram shows the apparatus used to prepare chlorine gas in the laboratory.



(a) At the start of the experiment the conical flask contains a manganese compound. Identify this compound and give its colour.

Compound

Colour

(2)

(b) The diagram shows the gas being collected by downward delivery. On what property of chlorine does this method depend?

.....

(1)

(c) What colour is seen in the gas jar as it fills with chlorine?

.....

(1)

(d) Describe a test for chlorine gas.

Test

Result

(2)



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blank

(e) In industry, chlorine is manufactured from brine.

(i) Name the compound in brine that is the source of chlorine.

.....
(1)

(ii) What method is used to obtain chlorine from brine?

.....
(1)

(iii) State **one** large-scale use of chlorine.

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

Q8

(Total 9 marks)

15



Turn over

Leave
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9. The formulae CH_4 and C_4H_{10} represent two organic compounds.

(a) State why these compounds are described as

(i) saturated.....
.....
(1)

(ii) hydrocarbons.....
.....
(1)

(b) CH_4 and C_4H_{10} are members of the same homologous series. All members of the same homologous series can be represented by a general formula.

(i) What is the general formula of this homologous series?
.....
(1)

(ii) To which homologous series do CH_4 and C_4H_{10} belong?
.....
(1)

(iii) Give **two** other features of members of the same homologous series.
1.....
2.....
(2)

(c) The compound C_4H_{10} exists as isomers. What is meant by the term **isomers**?

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

(Total 8 marks)

Q9



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10. The Periodic Table on page 2 may be useful in answering parts of this question.
The symbols of some atoms and ions are shown below.

Al Cl⁻ Mg Mg²⁺ Na⁺ O²⁻

(a) Which **one** of these is formed by the loss of one electron from an atom?

.....
(1)

(b) Which **one** of these is formed by the gain of two electrons by an atom?

.....
(1)

(c) Which **one** of these has the same electronic configuration as an atom of argon?

.....
(1)

(d) Which **one** of these has an electronic configuration of 2.8.2?

.....
(1)

(e) Which **three** of these have the same electronic configuration?

.....
(1)

(f) Compounds containing the ions listed include MgO and NaCl.
Which of these compounds has the higher melting point? Give a reason.

Compound with higher melting point

Reason

.....
(2)

(Total 7 marks)

Q10



11. The equation shows the formation of hydrogen chloride.



(a) (i) What does the symbol ΔH represent?

.....
(1)

(ii) ΔH is negative for this reaction. What does this indicate?

.....
(1)

(b) Each substance in the equation contains the same type of bonding. Name this type of bonding and describe how it forms.

Name

Description

.....
(3)

(c) Draw a dot and cross diagram to show the bonding in H_2 .

(1)

(d) H_2 molecules contain strong bonds. Explain why the boiling point of H_2 is low.

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

(e) Hydrogen chloride is soluble in both water and methylbenzene. What colour is phenolphthalein in each of these solutions?

Hydrogen chloride dissolved in water

Hydrogen chloride dissolved in methylbenzene

(2)



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blank

(f) A student carries out a test to show that a solution of hydrogen chloride contains chloride ions. First she adds dilute nitric acid.

(i) Name the other solution she adds.

.....
(1)

(ii) Describe what she observes.

.....
(1)

(iii) Complete the equation to show the reaction that occurs.

..... + HCl → +
(2)

Q11

(Total 14 marks)

TOTAL FOR SECTION B: 45 MARKS

TOTAL FOR PAPER: 100 MARKS

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