



Rewarding Learning

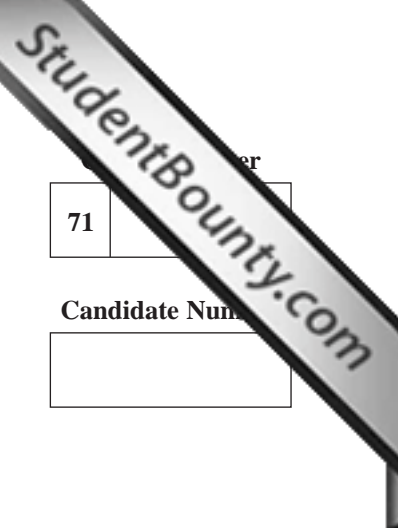
General Certificate of Secondary Education
2010

Science: Chemistry

Paper 1
Foundation Tier

[G1401]

WEDNESDAY 26 MAY, MORNING



71	er
Candidate Number	
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TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Answer **all five** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 90.

Quality of written communication will be assessed in question **2(a)(iv)**.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A Data Leaflet which includes a Periodic Table of the Elements is provided.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
Total Marks	

1 (a) The modern Periodic Table has been in use for over 100 years. Its development included the work of several chemists including John Newlands and Dmitri Mendeleev.

(i) What name was given to the law developed by John Newlands?

_____ [1]

(ii) State **three** features of the Periodic Table developed by Mendeleev which are different from the modern Periodic Table.

1. _____

2. _____

3. _____

_____ [3]

(b) The modern Periodic Table is made up of Groups and Periods. What name is given to the following Groups?

Group I _____

Group VII _____ [2]

Examiner Only

Marks

Remark

- (c) Often a short form of the Periodic Table like the one shown below is used.

Group	I	II	III	IV	V	VI	VII	0
H								He
Li	Be	B	C	N	O	F	Ne	
Na	Mg	Al	Si	P	S	Cl	Ar	
K	Ca	Ga	Ge	As	Se	Br	Kr	

Using ONLY the elements in the table above:

- (i) Name one noble gas.

_____ [1]

- (ii) Name one element which is a liquid at room temperature and pressure.

_____ [1]

- (iii) Name one diatomic gas.

_____ [1]

- (iv) Name one non-metal which is a solid at room temperature and pressure.

_____ [1]

- (v) Name one element which forms a simple ion with a charge of 2-

_____ [1]

- (vi) Suggest one reason why hydrogen may be placed in Group I.

_____ [1]

Examiner Only

Marks Remark

- (d) Group III of the Periodic Table contains the elements boron, aluminium and gallium.

Group III
${}_{5}^{11}\text{B}$
${}_{13}^{27}\text{Al}$
${}_{31}^{70}\text{Ga}$

All of these elements form compounds with oxygen and chlorine.

- (i) Write the formula of aluminium oxide.

_____ [1]

- (ii) Write a balanced symbol equation for the reaction of aluminium with chlorine.

_____ [3]

- (iii) In which period of the Periodic Table is gallium found?

_____ [1]

- (iv) Group III contains one non-metallic element. Name this element.

_____ [1]

- (v) The elements of Group III can form a simple ion with a 3+ charge. Name one other element, apart from those in Group III, which forms an ion with a 3+ charge. You may use your Data Leaflet to help answer this question.

_____ [1]

Examiner Only

Marks

Remark

2 Water is essential for life and is made up of two elements. Water melts at 0 °C and boils at 100 °C.

(a) (i) Write the chemical formula of water.

_____ [1]

(ii) State **two** other physical properties of water.

_____ [2]

(iii) Name the **two** elements that make up water.

_____ [2]

(iv) Describe a chemical test for water and state the result for a positive test.

_____ [3]

Quality of written communication [2]

(b) Many substances, such as sodium hydroxide and anhydrous calcium chloride, interact with moist air.

(i) Describe the observations made when some pellets of sodium hydroxide are left on a watch glass in the laboratory for several days.

_____ [3]

(ii) What do you understand by the term anhydrous?

_____ [2]

Examiner Only

Marks Remark

(c) Some substances dissolve very well in water and are said to have high solubility.

(i) Explain what is meant by the term solubility.

[4]

(ii) A student wants to dissolve some crystals in water. State two things the student could do to ensure the crystals dissolved quickly.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

- 3 (a) Use the words from the following list to complete the passage below about the element sulphur. Each may be used once, more than once, or not at all.

metal allotropes graphite monoclinic yellow soluble

plastic blue insoluble isotopes non-metal

The element sulphur is a _____. It has an atomic number of 16.

Sulphur exists in three different solid forms known as _____.

One form is known as rhombic sulphur whilst the other two forms are

known as _____ sulphur and _____ sulphur. Sulphur is

_____ in colour and is _____ in water. [6]

- (b) Sulphur undergoes combustion when heated in air.

- (i) Write a balanced symbol equation for the combustion of sulphur.

_____ [2]

- (ii) Describe what would be observed when sulphur undergoes combustion.

_____ [3]

Examiner Only

Marks Remark

(c) Air pollution is caused by the presence of substances which are bad for health. One of the main pollutants in air is sulphur dioxide.

(i) Name one source of sulphur dioxide pollution.

_____ [1]

(ii) Sulphur dioxide reacts with water vapour in the air to form acid rain. Write a balanced symbol equation for this reaction.

_____ [2]

(iii) Acid rain is a weak acid. Suggest the pH value of a sample of acid rain.

_____ [1]

(iv) State two effects of acid rain.

1. _____

2. _____

_____ [2]

(v) Suggest two ways of preventing the formation of acid rain.

1. _____

2. _____

_____ [2]

Examiner Only

Marks Remark

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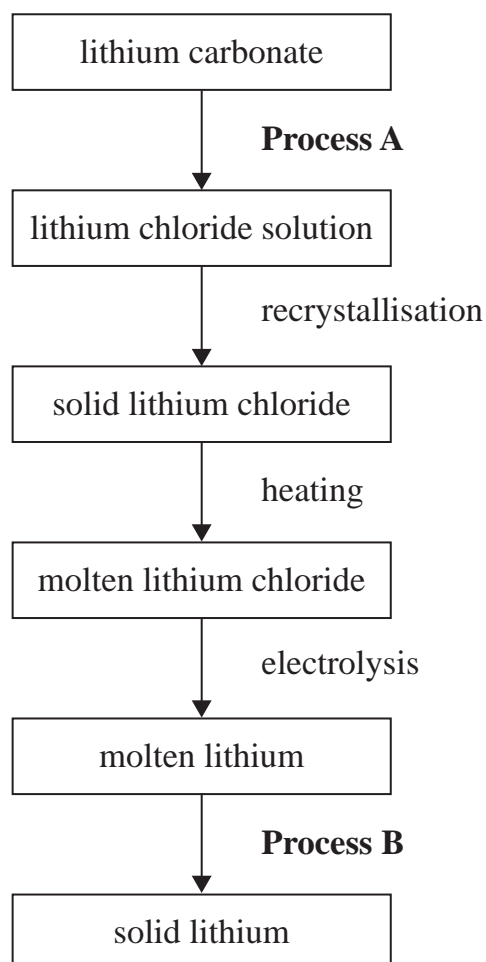
(Questions continue overleaf)

- 4 Lithium is a metal which is used in LCD televisions, computer monitors and mobile phones.



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- (a) Most lithium is obtained from lithium carbonate. The diagram below shows how solid lithium is produced from lithium carbonate.



Examiner Only

Marks Remark

- (i) Name the acid which would be added to lithium carbonate in **Process A** to make lithium chloride solution.

_____ [1]

- (ii) Write the chemical formula for lithium chloride.

_____ [1]

- (iii) What must be done to convert molten lithium to solid lithium in **Process B**?

_____ [1]

- (iv) Explain what is meant by the term electrolysis.

_____ [2]

- (b) Complete the table below by placing a tick (✓) to indicate if the substance conducts electricity or does not conduct electricity. Place only one tick for each substance.

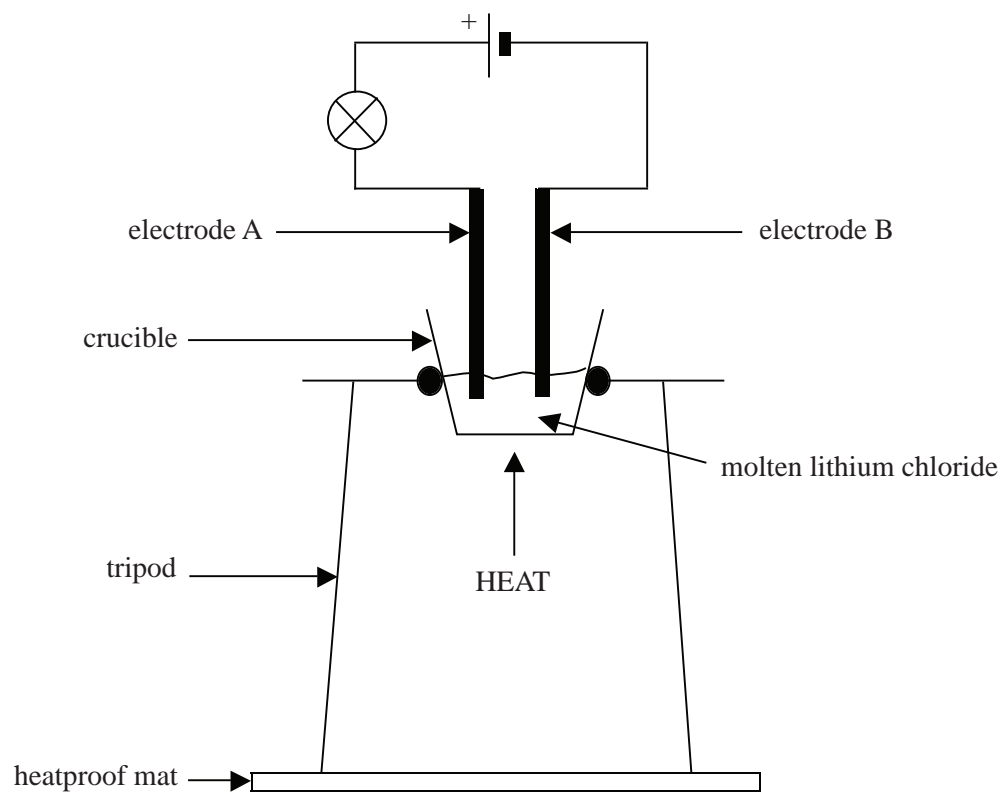
Substance	Conducts electricity	Does not conduct electricity
solid lithium		
molten lithium		
molten lithium chloride		
solid lithium chloride		
lithium chloride solution		

[5]

Examiner Only

Marks Remark

- (c) The electrolysis of molten lithium chloride may be carried out using the apparatus shown below.



- (i) Name electrode A and electrode B.

Electrode A _____

Electrode B _____ [2]

- (ii) What material is used to make the electrodes?

_____ [1]

- (iii) State one reason why this material is chosen to make the electrodes.

_____ [1]

- (iv) At which electrode, A or B, is lithium produced?

_____ [1]

Examiner Only

Marks Remark

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(Questions continue overleaf)

5 Fossil fuels are formed when dead plants and animals are subjected to heat and pressure over millions of years. They are non-renewable fuels.

(a) (i) Name three fossil fuels.

1. _____
2. _____
3. _____ [3]

(ii) Explain the meaning of the term non-renewable.

_____ [2]

(b) Fossil fuels undergo combustion when heated in air. The hydrocarbon methane is a widely used fuel.

(i) What do you understand by the term combustion?

_____ [3]

(ii) Explain what is meant by the term hydrocarbon.

_____ [2]

(iii) Write a balanced symbol equation for the complete combustion of methane.

_____ [3]

Examiner Only	
Marks	Remark

(iv) State two environmental problems caused by the combustion of fossil fuels.

1. _____

2. _____

_____ [2]

(c) If methane burns in a limited supply of air, a toxic product forms. Name this product.

_____ [1]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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