

Candidate Name	Centre Number	Candidate Number
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GCSE

236/01

**SCIENCE
FOUNDATION TIER
CHEMISTRY 1**

A.M. MONDAY, 17 January 2011

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	9	
2.	3	
3.	3	
4.	9	
5.	6	
6.	5	
7.	6	
8.	9	
Total	50	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The Periodic Table is printed on the back cover of the examination paper and the formulae for some common ions on the inside of the back cover.

Answer all questions.

1. (a) The following box contains some information about atoms. Read the information in the box and then answer the questions that follow.

Atoms are the smallest particles that make up elements. The word comes from the Greek word *atomos*. Atoms cannot be broken down into simpler substances by chemical means.

Atoms have a central nucleus that contains protons and neutrons. This is surrounded by orbits or shells that contain electrons.

An element is made up of only one type of atom. Different elements contain different atoms. When two different atoms join together, a compound is formed.

Use only the information in the box to answer the following questions.

- (i) What name is given to the smallest particles that make up an element? [1]
.....
- (ii) Name the **two** different particles found in the nucleus of an atom. [2]
..... and
- (iii) State in which part of the atom electrons are found. [1]
.....
- (iv) State what is meant by
- I. an element, [1]
.....
.....
- II. a compound. [1]
.....
.....

(b) The following table shows four compounds and their formulae.

Name of compound	Formula
ammonia	NH_3
carbon dioxide	CO_2
methane	CH_4
water	H_2O

Use the information in the table to answer the following questions.

(i) Give the **name** of the compound that contains the elements carbon and oxygen. [1]

.....

(ii) Give the **names** of the elements present in water. [1]

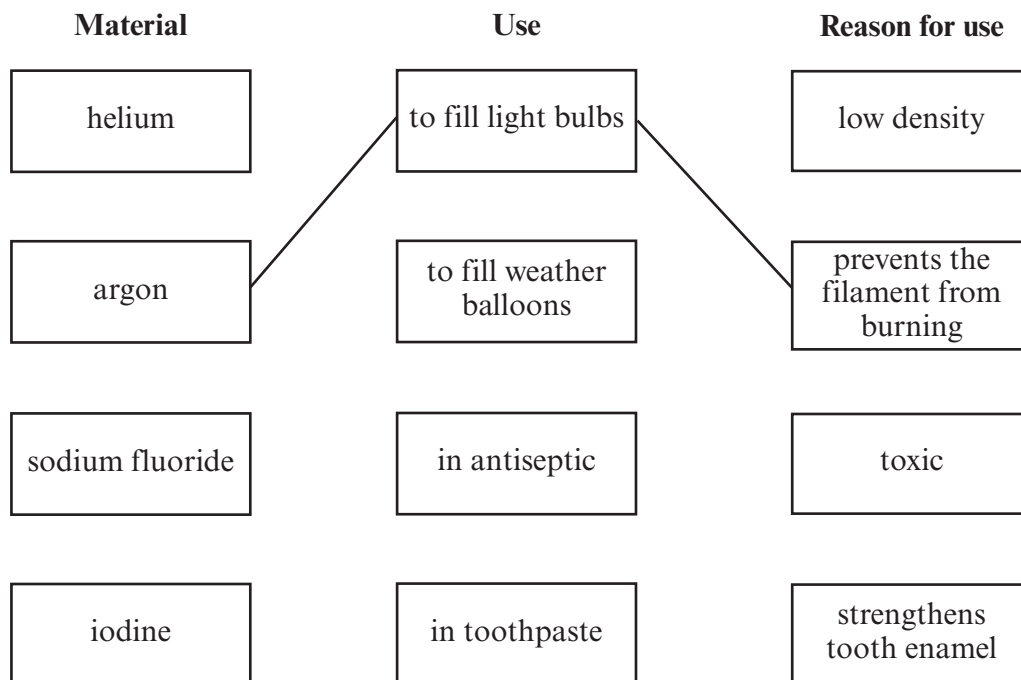
..... and

(iii) Place a tick (✓) in the box next to the diagram that best represents a molecule of ammonia, NH_3 . [1]

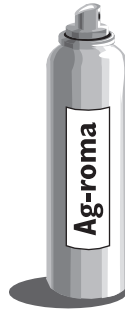


2. Draw a line to link each material to its use and the reason it is used in this way.
One has already been done for you.

[3]

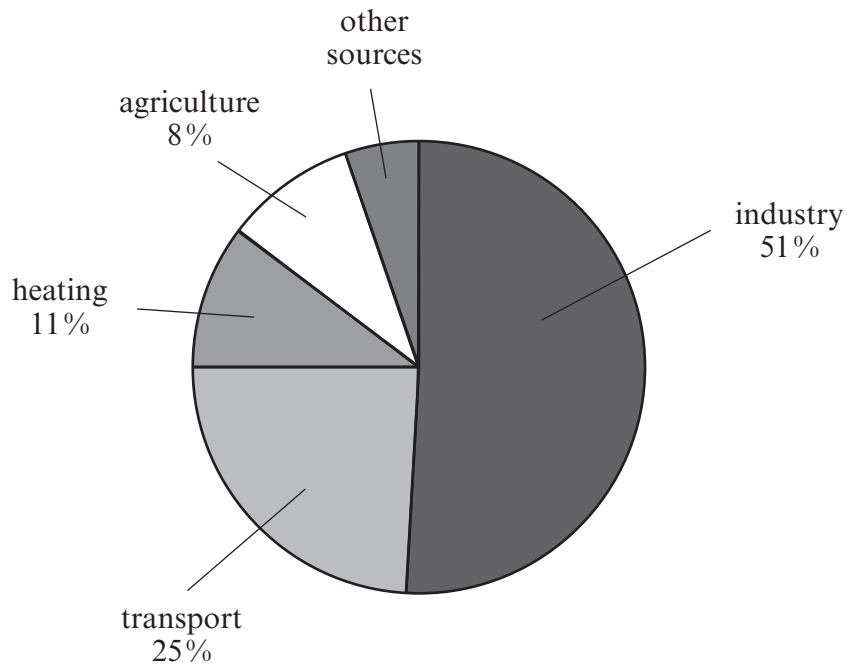


3. Nanoscience involves the study of particles with sizes in the range 1-100 nm. One new use of nano-sized silver particles is in deodorants. These deodorants are used to prevent body odour caused by bacteria.



- (i) State the property of nano-sized silver particles that enables them to be used in this way. [1]
-
- (ii) Give another use of nano-sized silver particles that depends on this property. [1]
-
- (iii) Some people are concerned that nanoparticles, being so small, could be absorbed into the body. Give **one** reason why this may be a cause for concern. [1]
-

4. (a) The following chart shows the sources of greenhouse gases.



Use the chart to answer parts (i) and (ii).

- (i) Name the main source of greenhouse gases. [1]
- (ii) Calculate the percentage of greenhouse gases produced by sources other than industry, transport, heating and agriculture. [2]

Other sources = %

(iii) I. Most scientists believe that greenhouse gases are causing an increase in the temperature of the Earth's atmosphere. Give the term used to describe this change. [1]

.....

II. Describe **one** environmental problem caused by this increase in temperature. [1]

.....

III. Suggest **one** way in which people could reduce the amount of greenhouse gases produced by transport. [1]

.....

.....

(b) Gases such as methane are used as fuels in the home. The combustion of methane produces the greenhouse gas carbon dioxide, and water. The reaction is exothermic.

I. Give the meaning of the term *exothermic*. [1]

.....

II. Write a **word equation** to show the combustion of methane. [2]

..... + → +

5. In 1915, a famous scientist suggested that the Earth's continents were once joined together as shown below.



- (i) From the box below, choose the name of the scientist who suggested this idea. [1]

Charles Darwin

Dmitri Mendeleev

Isaac Newton

Alfred Wegener

Scientist

- (ii) Using the letter **A**, **B**, **C** or **D**, choose from the box below the piece of evidence that this scientist did **not use** to support his idea. [1]

A - similar fossils were found on different continents

B - similar plants were found on different continents

C - similar rocks were found on different continents

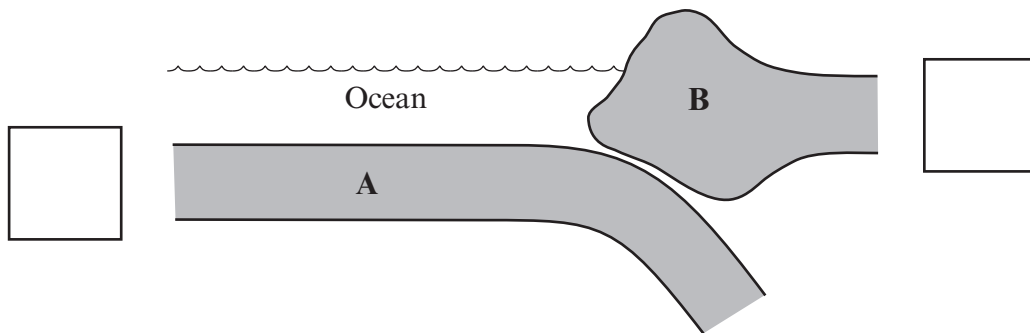
D - the coastlines fitted together like a jigsaw

Choice of letter

- (iii) Give **one** reason why his ideas were finally accepted in the 1960s. [1]

.....

(iv) The following diagram shows a possible effect of plate movement.



- I. Place arrows in the boxes to show the direction of movement of plates **A** and **B**. [1]
- II. Tick (✓) the boxes next to the **two** statements below which describe what happens to plate **A** as a result of this movement. [2]

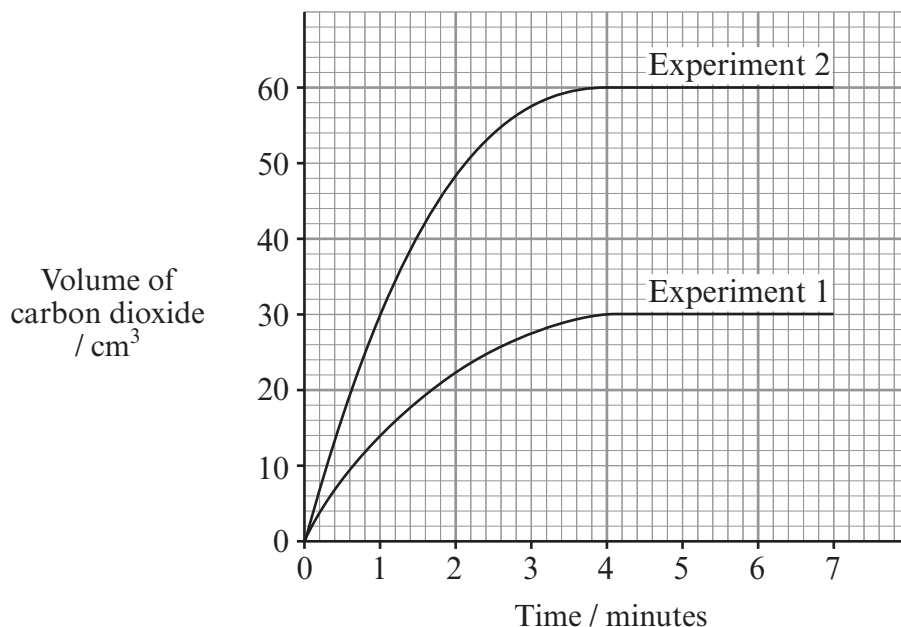
It cools down

It melts to form magma

It heats up

It is pushed on top of plate **B**

6. A student studied the rate of reaction between hydrochloric acid and marble chips. He added *excess* acid to different amounts of marble chips and recorded the volume of gas produced every minute. The results are shown in the graph below.



Use the graph above to answer the following questions.

(i) Give

I. the volume of gas produced after 1 minute in experiment 2, [1]

..... cm³

II. the time taken for the reaction to end in experiment 1. [1]

..... minutes

(ii) 0.2 g of marble chips were used in experiment 1. Give the mass of marble chips used in experiment 2. [1]

Mass = g

(iii) The reaction in experiment 2 was faster than that in experiment 1. Explain how the graph shows this. [1]

.....

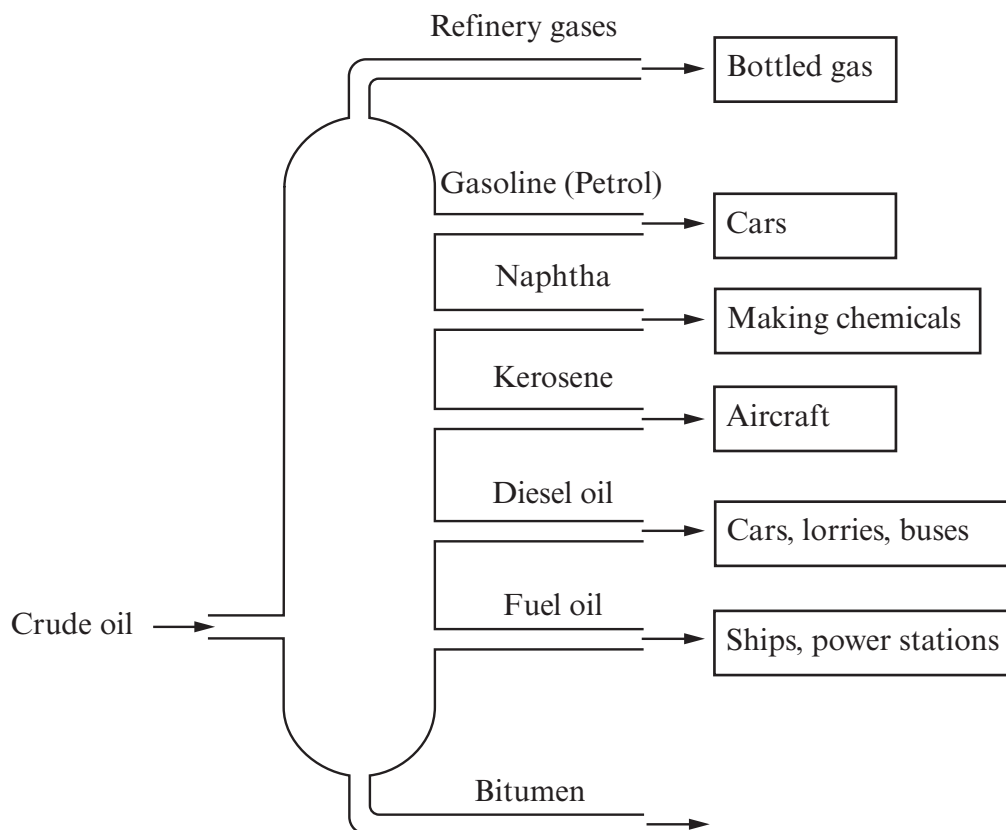
.....

(iv) State what could have been done to the hydrochloric acid in these experiments to make the reactions even faster. [1]

.....

.....

7. (a) The following diagram summarises the industrial fractional distillation of crude oil.



Use the diagram above to help you answer the following questions.

- (i) State what must happen to the crude oil before it enters the column. [1]

- (ii) State how the temperature changes from the bottom to the top of the column. [1]

- (iii) At which point in the column are the smallest molecules collected? [1]

- (iv) The fractions are collected as liquids. Name the physical process taking place when a gas changes to a liquid. [1]

- (v) Differences in which physical property allow the fractions to be collected at different levels in the column? [1]

- (b) Many of the fractions are used as fuels and contain sulphur impurities. Name the environmental problem caused by the burning of these sulphur impurities. [1]

8. (a) Use the **data** and **key** on the Periodic Table of Elements, shown on the back page of this examination paper, to answer the following questions.

(i) The chemical **symbol** for gold is [1]

(ii) The element with the atomic number 9 is [1]

(iii) An element has the electronic structure 2,8,5.

I. State the group and period in which this element is found and explain your answers in terms of its electronic structure. [2]

Group

Reason

.....

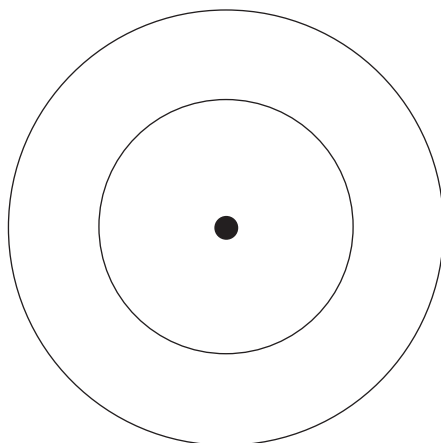
Period

Reason

.....

II. Identify this element. [1]

(b) Using **X** to represent an electron, complete the following diagram to show the electronic structure of boron. [1]



(c) The following diagram shows the Periodic Table that was published by Mendeleev in 1869.

Group \ Period	1	2	3	4	5	6	7	0
1	H							
2	Li	Be	B	C	N	O	F	
3	Na	Mg	Al	Si	P	S	Cl	
4	K Cu	Ca Zn	* *	Ti *	V As	Cr Se	Mn Br	Fe Co Ni
5	Rb Ag	Sr Cd	Y In	Zr Sn	Nb Sb	Mo Te	* I	Ru Rh Pd

(i) Give a reason why Mendeleev used * in some of the boxes. [1]

.....

(ii) Name **two** elements present in Group 1 of Mendeleev's table that are not in Group 1 of the present day Periodic Table. [1]

..... and

(iii) Mendeleev arranged the elements in order of increasing atomic mass. State how the elements are arranged in the present day Periodic Table. [1]

.....

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FORMULAE FOR SOME COMMON IONS

POSITIVE IONS		NEGATIVE IONS	
Name	Formula	Name	Formula
Aluminium	Al³⁺	Bromide	Br⁻
Ammonium	NH₄⁺	Carbonate	CO₃²⁻
Barium	Ba²⁺	Chloride	Cl⁻
Calcium	Ca²⁺	Fluoride	F⁻
Copper(II)	Cu²⁺	Hydroxide	OH⁻
Hydrogen	H⁺	Iodide	I⁻
Iron(II)	Fe²⁺	Nitrate	NO₃⁻
Iron(III)	Fe³⁺	Oxide	O²⁻
Lithium	Li⁺	Sulphate	SO₄²⁻
Magnesium	Mg²⁺		
Nickel	Ni²⁺		
Potassium	K⁺		
Silver	Ag⁺		
Sodium	Na⁺		

