

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE**

A322/01

CHEMISTRY A

Unit 2 Modules C4 C5 C6
(Foundation Tier)

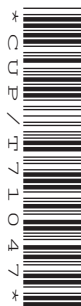
Candidates answer on the question paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:
Pencil
Ruler (cm/mm)

**Friday 23 January 2009
Morning**

Duration: 40 minutes



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **42**.
- The Periodic Table is printed on the back page.
- This document consists of **16** pages. Any blank pages are indicated.

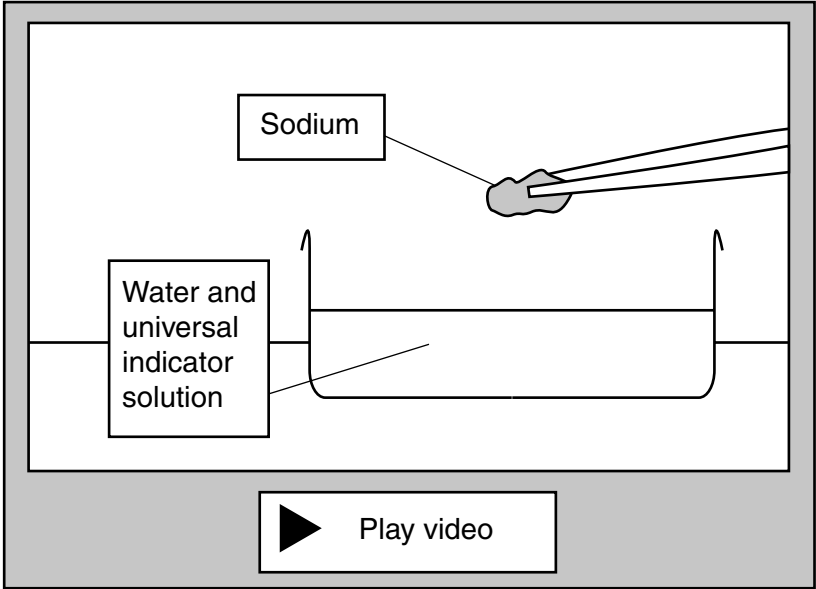
FOR EXAMINER'S USE

Qu.	Max.	Mark
1	8	
2	6	
3	5	
4	6	
5	2	
6	10	
7	5	
TOTAL	42	

Answer **all** the questions.

- 1 Eve looks at a website about sodium.
She watches a video of sodium reacting with water. The water contains universal indicator solution.

Sodium



Symbol

Appearance

Reaction with water

- (a) What will Eve see happen when the sodium is added to the water?

Puts ticks (✓) in the boxes next to the **two** correct answers.

- The piece of sodium sinks.
- The universal indicator solution turns red.
- The piece of sodium gets bigger.
- The piece of sodium fizzes.
- The piece of sodium moves around quickly.
- The level of the water falls.

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

[2]

3

- (b) Why is it a good idea to watch a video of the reaction of sodium with water instead of doing it yourself?

Put a tick (✓) in the box next to the correct answer.

The chemicals are very hazardous.

☐

Sodium does not react with water very easily.

☐

Sodium is too rare to use.

☐

Sodium is too soft.

☐

[1]

- (c) Eve clicks on the button to find out the symbol for sodium.

Put a ring around the correct symbol for sodium.

S

So

Na

NaCl

[1]

- (d) Eve clicks on the button to find out the appearance of sodium.

Which statements about the appearance of sodium are correct?

Put ticks (✓) in the boxes next to the **two** correct answers.

When sodium is cut it is very shiny.

☐

Sodium looks like white crystals.

☐

Sodium goes dull quickly in the air.

☐

Sodium is a liquid at room temperature.

☐

Sodium gives off a yellow vapour.

☐

[2]

- (e) Eve looks at other elements on the website.

Join the boxes to connect each **element** with its correct **statement**.

potassium

is in the same group but is less reactive than sodium

lithium

has the symbol K

calcium

reacts with sodium to make salt

chlorine

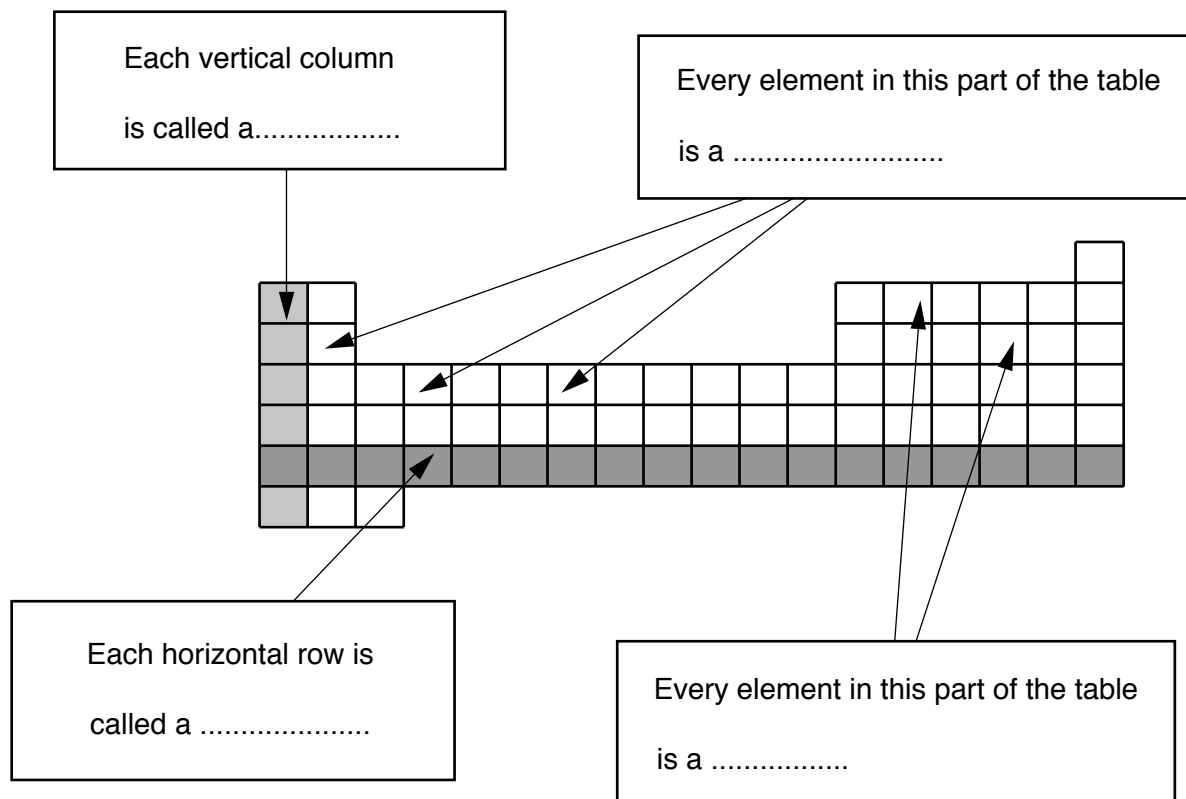
is a metal and is in a different group to sodium

[2]

[Total: 8]

- 2 The diagram shows an outline of the Periodic Table.
- (a) Complete the labels by filling in the missing words.
Choose words from this list.

liquid group period metal non-metal series



[3]

- (b) Fluorine is an element in the Periodic Table.

Here is some information about fluorine atoms.

proton number	9
mass number	19
electron arrangement	2.7

Complete the sentences by filling in the gaps.

Choose words from this list.

seven nine nineteen two
electrons halogens neutrons

Fluorine atoms contain protons.

The outer shell contains electrons.

The nucleus of a fluorine atom also contains ten

[3]

[Total: 6]

3 The diagrams show the structures of some of the molecules in air.

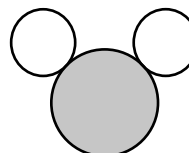
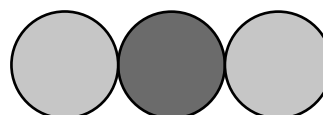
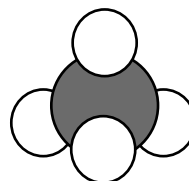
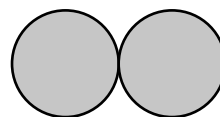
(a) Draw straight lines to join each **gas** to the correct **structure**.

methane
 CH_4

carbon dioxide
 CO_2

oxygen
 O_2

water
 H_2O



[3]

6

(b) Which of the statements about gases in the air are **true** and which are **false**?

Put ticks (✓) in the correct boxes.

statement	true	false
Gases are good conductors of electricity.		
Gases in the air are made of small molecules.		
There are very weak forces of attraction between gas molecules.		

[2]

[Total: 5]

- 4 Joe is working for a mining company.

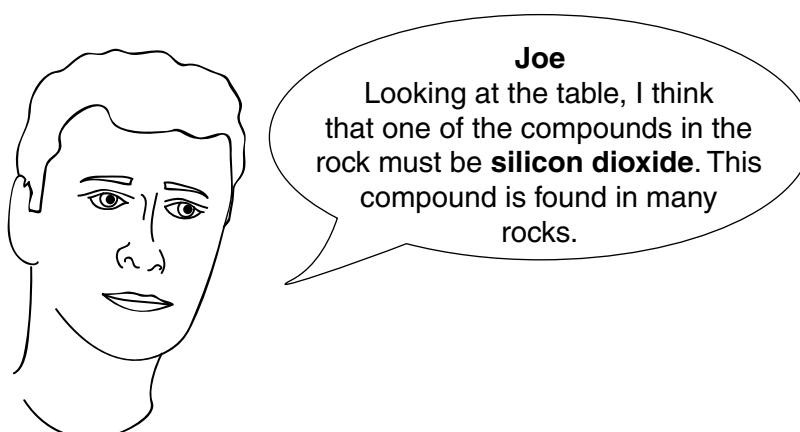
He carries out some tests on a sample of rock.
The table shows the elements he finds in the rock.

element	percentage (%)
silicon	35
oxygen	45
calcium	5
carbon	5
copper	0.5
other elements	

- (a) What percentage of the rock is 'other elements'?

..... % [1]

- (b) Joe thinks that the rock contains silicon dioxide.



- (i) Why does Joe think that the rock contains silicon dioxide?

Put ticks (✓) in the boxes next to the **two** correct answers.

The rocks only contain silicon and oxygen.

☐

Most silicon and oxygen in the Earth's crust is in the form of silicon dioxide.

☐

The table shows that there are large amounts of silicon and oxygen in the rock.

☐

[1]

8

- (ii) Joe says that silicon dioxide is very hard.
What other properties does silicon dioxide have?

Put ticks (✓) in the boxes next to the **two** correct answers.

high melting point

☐

does not dissolve in water

☐

turns into a liquid easily

☐

grey and shiny like a metal

☐

[2]

- (c) The rock contains 0.5% copper.
Joe thinks that extracting copper from this rock might harm the environment.
Which statement explains why?

Put a tick (✓) in the box next to the correct answer.

copper is found in other rocks

☐

copper is a Group 1 element

☐

there would be a lot of waste rock left over

☐

the rock contains calcium

☐

[1]

- (d) The rock contains copper oxide.
Copper metal can be extracted from copper oxide by heating with carbon.
What type of chemical reaction happens to the copper oxide during the extraction?

Put a tick (✓) in the box next to the correct answer.

combustion

☐

neutralisation

☐

oxidation

☐

reduction

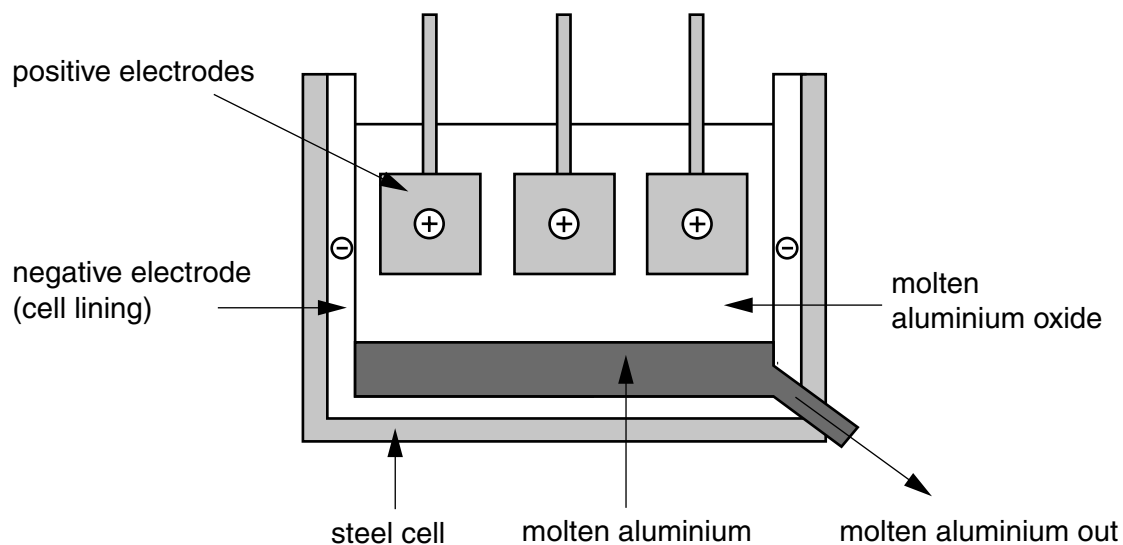
☐

[1]

[Total: 6]

9

5 This diagram shows the electrolysis of aluminium oxide.



These sentences describe what happens during the electrolysis. Complete the sentences.

Choose words from this list.

electricity heat hydrogen negative oxygen positive

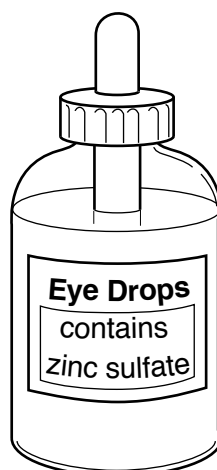
The aluminium oxide must be melted so that it conducts

Aluminium ions (Al^{3+}) are positively charged. They turn into aluminium metal at the electrode.

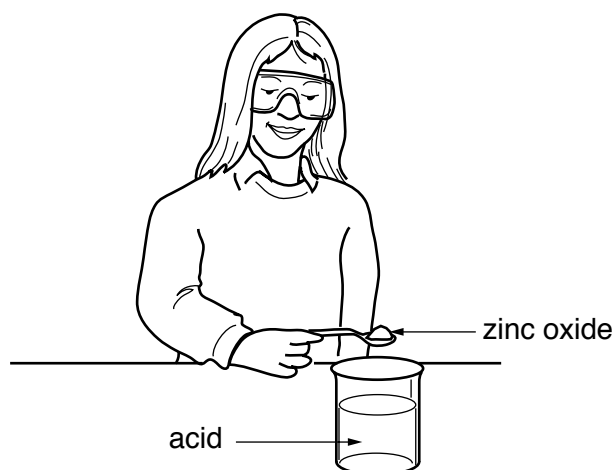
At the other electrode, a gas called forms. [2]

[Total: 2]

- 6 Zinc sulfate is a salt used in eye drops.



- (a) Liz makes some zinc sulfate by adding large lumps of zinc oxide to an acid.



Complete the equation by filling in the **name** and **formula** of the acid Liz uses.



[2]

11

- (b) Liz tests the pH of the acid before she adds the zinc oxide.
Which of the following would **not** show the pH of the acid?

Put a tick (✓) in the box next to the correct answer.

Universal Indicator paper	<input type="checkbox"/>
pH probe	<input type="checkbox"/>
Universal Indicator solution	<input type="checkbox"/>
litmus paper	<input type="checkbox"/>

[1]

- (c) Liz thinks that the reaction is too slow.
She decides to use powdered zinc oxide and to change the temperature.
The sentences below explain what happens.

Put a ring around the correct word in each sentence.

Using powdered zinc oxide makes the surface area **smaller** / larger.

This makes the reaction happen **faster** / slower.

The reaction will be faster if the temperature is **lower** / higher.

Another way of making the reaction faster is to use acid that is **more** / less concentrated.

[2]

- (d) (i) Liz works out the relative formula mass of zinc sulfate.
She uses these relative atomic masses.

Zn = 65 S = 32 O = 16

Complete the table to show the relative formula mass of zinc oxide, ZnO.

	zinc oxide ZnO	zinc sulfate ZnSO ₄
relative formula mass		161

[1]

12

- (ii) Liz calculates what her yield should be by working out how much zinc sulfate should be made from the amount of acid she started with.
This is her theoretical yield.
She wants to calculate her **percentage** yield.

These are the figures she uses.

Mass of zinc sulfate I made in my experiment	=	15 g
My theoretical yield	=	60 g

What is the percentage yield for Liz's experiment?

Put a ring around the correct answer.

10% 25% 50% 400% 900%

[1]

- (e) Liz thinks her yield is too low.
What might have caused a low yield?

Put ticks (✓) in the boxes next to the **two** correct answers.

Liz spilt some of her product out of the beaker.

☐

Liz heated up her mixture.

☐

Liz left the chemicals too long to react.

☐

Liz did not check the temperature of the acid.

☐

Liz did not measure out enough acid.

☐

[2]

- (f) Liz knows that the zinc sulfate that she has made cannot be used for making eye drops.

Why is her zinc sulfate not suitable?

Put a tick (✓) in the box next to the correct answer.

She should have carried out a titration.

☐

The product has not been purified.

☐

She did not check the pH of the zinc oxide.

☐

She has not controlled the rate of reaction.

☐

[1]

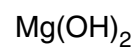
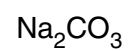
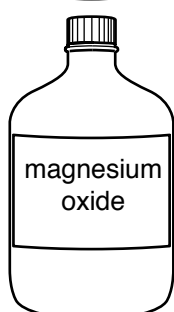
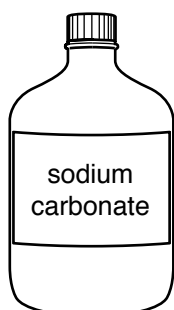
[Total: 10]

7 Rose works as a laboratory technician.

She is writing labels for some chemicals.

(a) Which formula should Rose write on each label?

Draw a straight line to connect each **chemical** to its correct **formula**.



[3]

14

(b) The label on the bottle of hydrochloric acid has this hazard warning.



What should Rose do when she uses the acid?

Put ticks (✓) in the boxes next to the **two** best answers.

wear goggles

☐

keep it away from naked flames

☐

be careful because it is poisonous

☐

handle carefully because it might explode

☐

make sure she does not get splashes on her skin

☐

[2]

[Total: 5]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE

16

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.