

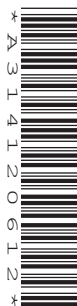
Monday 25 June 2012 – Afternoon**GCSE TWENTY FIRST CENTURY SCIENCE
CHEMISTRY A****A322/01** Unit 2: Modules C4 C5 C6 (Foundation Tier)

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)

Duration: 40 minutes

Candidate forename		Candidate surname	
Centre number		Candidate number	

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

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**.
- This document consists of **16** pages. Any blank pages are indicated.
- The Periodic Table is printed on the back page.

Answer **all** the questions.

- 1 The table shows data about the properties of some Group 1 elements.

Element	Properties			
	Melting point in °C	Boiling point in °C	Density in g/cm ³	Formula of hydroxide
Lithium	180.0	1330	0.53	LiOH
Sodium	97.8	890	0.97	NaOH
Potassium	63.7	774	0.86	KOH
Rubidium	38.9	688	1.53	RbOH

- (a) Elements in the same group show similarities and trends in their properties.

- (i) What similarities and trends are shown in the table?

.....

 [3]

- (ii) Which property in the table does **not** show a clear trend? Explain your reasoning.

.....

 [2]

- (b) Sea salt contains both sodium chloride and potassium chloride.

The formula for sodium chloride is NaCl.

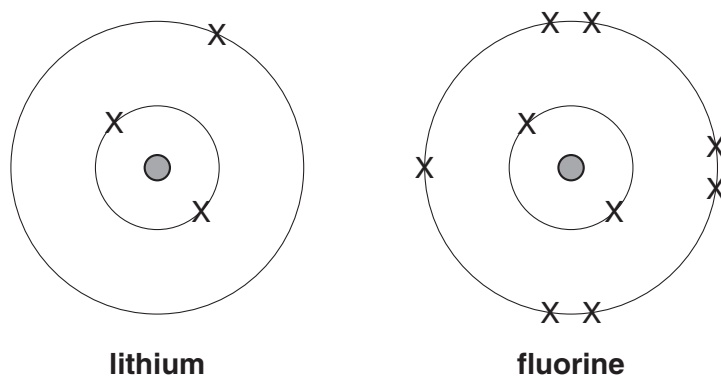
What is the formula for potassium chloride?

formula [1]

[Total: 6]

3

- 2 The diagram shows the arrangement of electrons in an atom of lithium and an atom of fluorine.



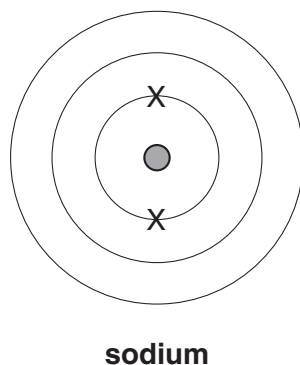
- (a) The electron arrangement of the lithium atom is 2.1.

What is the electron arrangement of the fluorine atom?

answer [1]

- (b) Sodium has eleven electrons.

Complete the diagram to show the arrangement of all of the electrons in a sodium atom.



[1]

- (c) Give the names of the two particles found in the nucleus of an atom.

..... and [1]

[Total: 3]

4

3 Chlorine, bromine and iodine are in Group 7 of the Periodic Table.

(a) Draw three straight lines to connect each **element** to its correct **appearance** at room temperature and pressure.

element	appearance
	grey solid
	red-brown solid
chlorine	green gas
bromine	grey gas
iodine	red-brown liquid
	green liquid

[2]

(b) (i) Joe does an experiment. He reacts sodium with chlorine to make sodium chloride.

Write a word equation for this reaction.

..... [1]

5

- (ii) Joe knows that chlorine is hazardous.

What is the correct hazard symbol for chlorine?

Put a ring around the correct answer.



[1]

[Total: 4]

6

4 Four gases that are in the air are nitrogen, oxygen, argon and carbon dioxide.

(a) Draw four lines to connect the **name** of each gas to the correct **arrangement of atoms and its relative mass**.

name	arrangement of atoms and relative mass
nitrogen	 relative mass = 32
oxygen	 relative mass = 40
argon	 relative mass = 44
carbon dioxide	 relative mass = 28

[2]

(b) Which of the following statements about gases in the air are **true**?

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

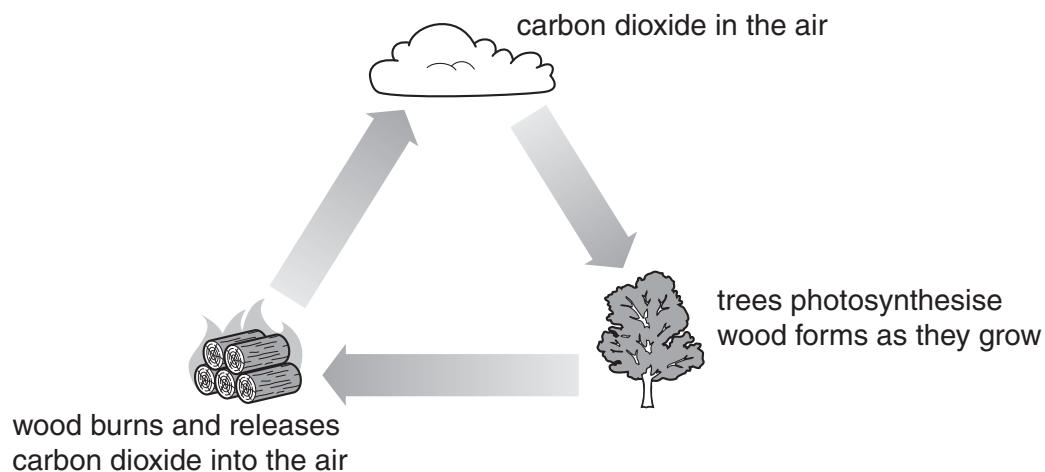
- All of the gases in the air are elements. ☐
- Air contains only non-metal elements. ☐
- There are weak attractions between molecules in the air. ☐
- All the gases have high melting points and boiling points. ☐
- The gases are good conductors of electricity. ☐

[2]

[Total: 4]

- 5 Some people burn wood to heat their houses because they say it is a **carbon neutral fuel**.

A carbon neutral fuel does not add to the amount of carbon dioxide in the air.



- (a) Use the diagram to explain why wood is a **carbon neutral fuel**.

.....

.....

.....

..... [3]

- (b) There are four main elements in **all** living things.

One of the elements is carbon.

What are the other three?

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

hydrogen, oxygen and nitrogen

☐

oxygen, nitrogen and chlorine

☐

silicon, oxygen and nitrogen

☐

iron, hydrogen and oxygen

☐

[1]

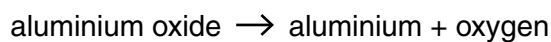
[Total: 4]

8

- 6 Aluminium is extracted from its ore by electrolysis.

Aluminium ore contains aluminium oxide.

- (a) This is the word equation for the reaction.



The aluminium oxide is reduced.

What does this mean?

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

The aluminium oxide loses oxygen.

☐

The density of the aluminium oxide decreases.

☐

The aluminium oxide loses energy.

☐

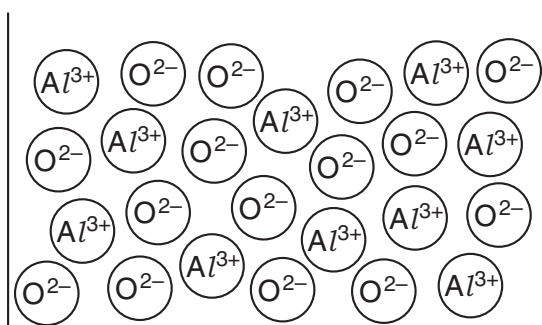
The volume of the aluminium oxide decreases.

☐

[1]

- (b) The electrolysis process uses molten aluminium oxide.

The diagram shows the arrangement of particles in molten aluminium oxide.



- (i) Which two words can be used to describe molten aluminium oxide?

Put rings around the **two** correct answers.

covalent

gas

ionic

liquid

molecular

solid

[2]

9

- (ii) During the electrolysis, negative ions move to the positive electrode and positive ions move to the negative electrode. A product is made at each electrode.

Draw two straight lines to connect each **electrode** with the correct **product made**.

electrode	product made
	aluminium
	aluminium oxide
positive electrode	water
negative electrode	hydrogen
	oxygen

[2]

- (c) Aluminium has many different uses.

The uses of aluminium depend on making the best use of its properties.

Draw four straight lines to connect each **use** with the **most important reason** for that use.

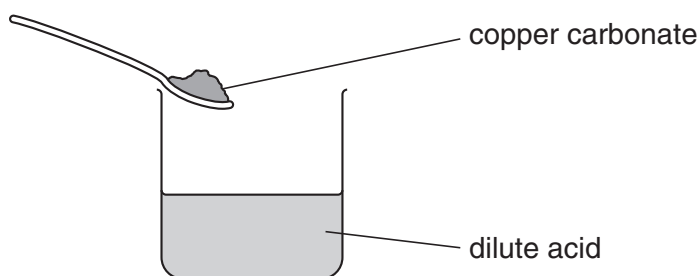
use	most important reason
aircraft parts	low density and can be mixed with other metals to make it strong
power cables	shiny appearance and surface can be coloured using dyes
drinks and food cans	surface is non-toxic and does not react with dilute acids
jewellery	very good electrical conductivity and can be shaped into wires

[2]

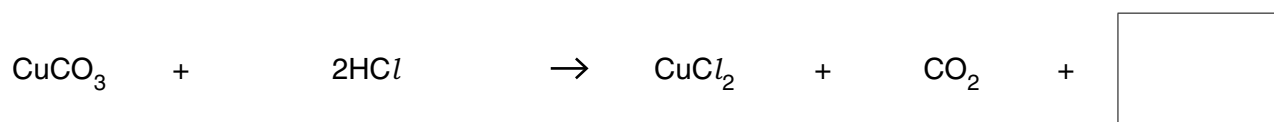
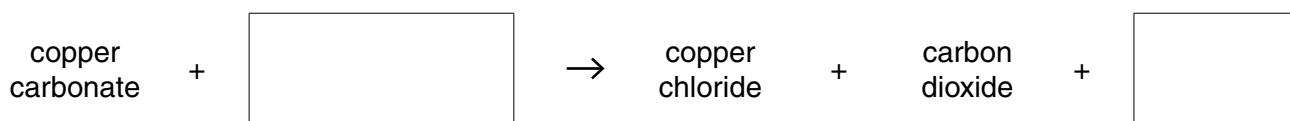
[Total: 7]

10

- 7 Sue makes some copper chloride crystals. She adds copper carbonate to a dilute acid.



- (a) Complete the word and symbol equations for the reaction by filling in the empty boxes.



[2]

- (b) Which other chemicals react with the same dilute acid to form copper chloride?

Put rings around the **two** correct answers.

copper hydroxide

copper nitrate

copper oxide

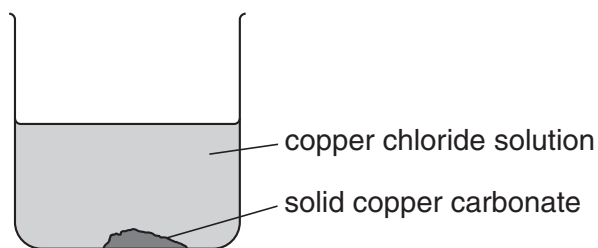
copper sulfate

[1]

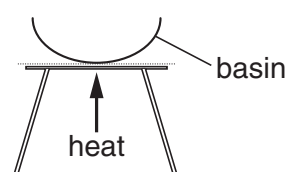
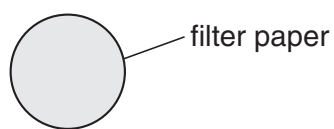
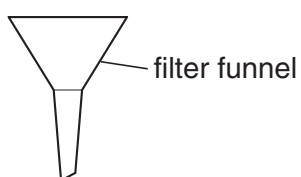
11

- (c) Sue adds solid copper carbonate to the dilute acid until no more reacts.

At the end of the experiment, the beaker contains copper chloride solution and some left-over solid copper carbonate.



She has this equipment.



Describe how Sue makes some copper chloride crystals using this equipment.

.....

.....

.....

.....

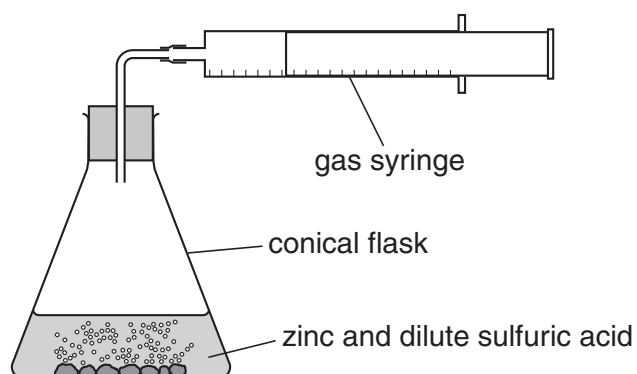
..... [4]

[Total: 7]

12

- 8 Alex adds some zinc to some dilute sulfuric acid.

He measures the volume of hydrogen given off every 30 seconds.



- (a) Draw three straight lines to connect each **chemical** to its correct **state symbol**.

chemical	state symbol
hydrogen	(s)
zinc	(g)
dilute sulfuric acid	(aq)

[2]

13

(b) Zinc reacts with sulfuric acid.

Which salt is made?

Put a (ring) around the correct answer.

zinc chloride

zinc hydroxide

zinc nitrate

zinc sulfate

[1]

(c) Alex thinks that the reaction is too slow.

What could Alex do to make the reaction faster?

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

Use the same mass of zinc but in larger pieces.

☐

Use a higher concentration of acid.

☐

Do the experiment at a lower temperature.

☐

Use a lower mass of zinc.

☐

Increase the surface area of the zinc.

☐

Use a larger gas syringe.

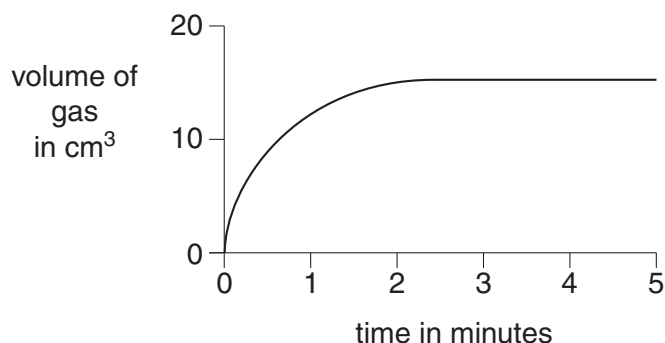
☐

[2]

14

(d) Alex measures the volume of hydrogen in the gas syringe for 5 minutes.

He plots his results on a graph.



(i) Which statement is the best description of what is happening at the **start** of the reaction?

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

No reaction is happening.

☐

The reaction rate is at its fastest.

☐

The reaction is slow but getting faster.

☐

The reaction is happening at a constant rate.

☐

[1]

(ii) Which statement is the best description of what is happening after 5 minutes?

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

The reaction has stopped.

☐

The reaction rate is at its fastest.

☐

The reaction is increasing in rate.

☐

Gas is being given off at a constant rate.

☐

[1]

[Total: 7]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

The Periodic Table of the Elements

© OCR 2012

16

1	2	Key										3	4	5	6	7	0		
		relative atomic mass atomic symbol name atomic (proton) number																1 H hydrogen 1	
7 Li lithium 3	9 Be beryllium 4																	4 He helium 2	
23 Na sodium 11	24 Mg magnesium 12																	19 F fluorine 9	
20 Ca calcium 20	40 Ar argon 18																	20 Ne neon 10	
39 K potassium 19	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36			
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	127 I iodine 53	131 Xe xenon 54			
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86		
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated								

16

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* 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.