CCEA GCSE SCIENCE: SINGLE AWARD

SCIENCE



EXAM QUESTION PACK

UNIT 2 (CHEMISTRY) FOUNDATION TIER GSS21 PAPERS

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2016–2017

Science: Single Award

Unit 2 (Chemistry)
Foundation Tier

GSS21

[GSS21]

THURSDAY 10 NOVEMBER 2016, MORNING

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 nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **8**.
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 included for your use.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** Given below is information about some household substances.

Complete the table.

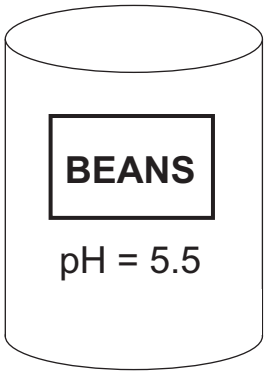
Choose from:

red **1** **10** **orange** **14** **blue**

Substance	Universal Indicator colour	pH number
toothpaste	blue	
lemon juice		4
oven cleaner	purple	

[3]

Many foods contain either an acid or an alkali.



Source: Chief Examiner

(b) Describe the pH of the can of beans shown above.

Circle the correct answer.

strong acid : **weak alkali** : **weak acid** : **strong alkali**

[1]

(c) Complete the following sentence.

Pure water is a neutral substance and has a pH value of _____.

[1]

2 Some chemicals have symbols on their labels to warn of danger.

Examiner Only	
Marks	Remark

(a) What name is given to these symbols?

_____ [1]

(b) Name the symbol shown below.



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_____ [1]

(c) Suggest **one** reason why symbols are better than words.

_____

_____ [1]

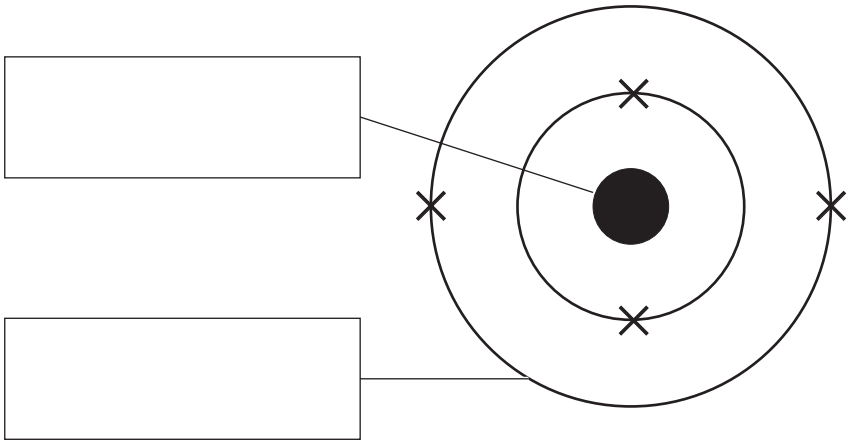
(d) What is the danger of a toxic substance?

_____

_____ [1]

Examiner Only	
Marks	Remark

3 The diagram below shows an atom.



Source: Chief Examiner

(a) Label the parts of the atom shown above.

Choose from:

layer **shell** **core** **nucleus** **centre**

[2]

(b) Complete the following sentence about protons in an atom.

Choose from:

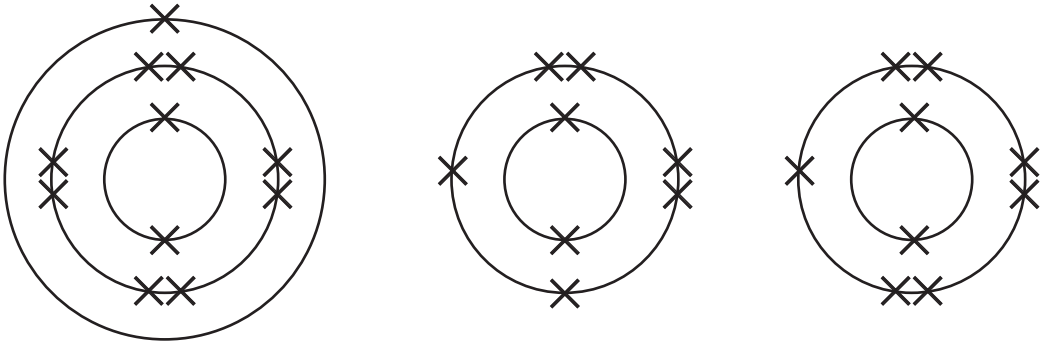
negative **one** **zero**

positive **neutral** **two**

Protons have a _____ charge and

a relative mass of _____. [2]

Shown below are the electronic structures of three atoms.



A **B** **C**

Source: Chief Examiner

(c) Which diagram (**A**, **B** or **C**) shows the electronic structure for a sodium atom?

_____ [1]

Shown below is a label found on a bottle of water.

Ions present	%
calcium	35
magnesium	20
phosphate	5
potassium	12
sodium	
sulfate	4

Source: Chief Examiner

(d) Calculate the percentage (%) of sodium ions in this water.

(Show your working out.)

_____ % [2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

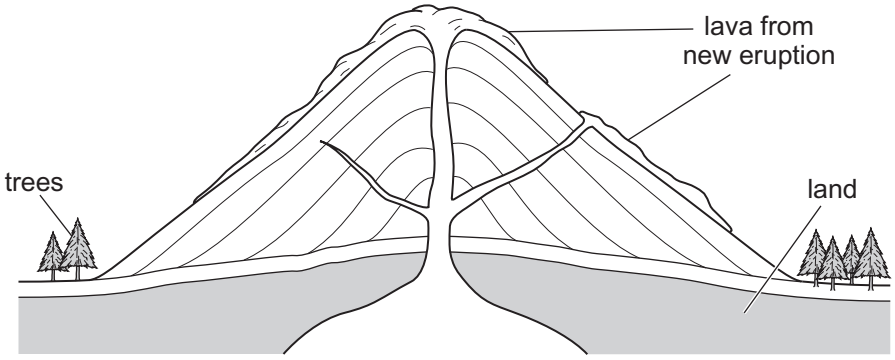
4 Below are two types of rock and some named examples.

(a) Using lines match each type of rock with one example.

Type of rock	Example
metamorphic	limestone
sedimentary	marble
	granite

[2]

(b) Volcanoes are often found at tectonic plate boundaries.
The diagram below shows a cross section through a volcano.



Source: CCEA

(i) On the diagram above use the letter **X** to show the magma chamber. [1]

(ii) Including the new eruption how many times has this volcano erupted?

_____ [1]

(iii) Name the **type** of rock formed from volcanic eruptions.

_____ [1]

(c) Earthquakes can also happen at tectonic plate boundaries.
Name the scale used to measure the strength of earthquakes.

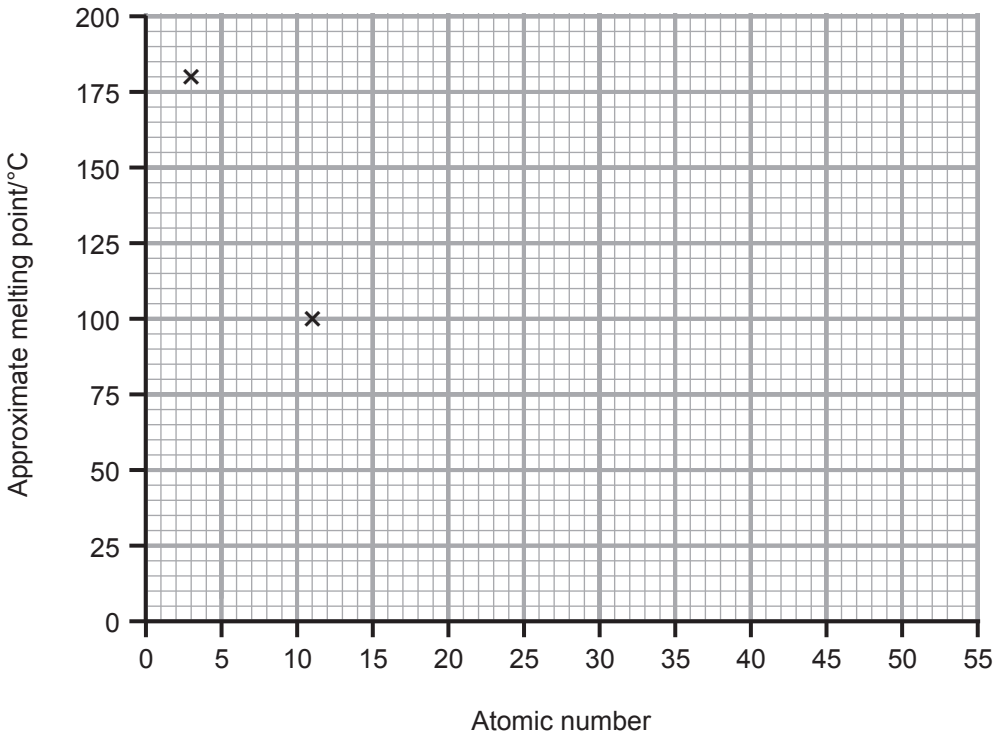
_____ [1]

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5 **(a)** The table below shows information about the elements in Group 1 of the Periodic Table.

Name	Atomic number	Approximate melting point/°C
lithium	3	180
sodium	11	100
potassium	19	65
rubidium	37	40
caesium	55	30

(i) On the grid below, complete the line graph for this information.



[3]

(ii) Describe the trend shown by this information.

_____

_____ [1]

(b) What name is given to Group 1 of the Periodic Table?

_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 The table below shows information about the reactions of some metals with cold water and hot water (or steam).

Metal	Reaction with cold water	Reaction with hot water (or steam)
magnesium	very slow reaction	reacts rapidly
zinc	no reaction	reacts slowly
sodium	violent reaction, floats on surface often burning with a coloured flame	very violent reaction, burns with a coloured flame
lead	no reaction	reacts very slowly
copper	no reaction	no reaction

(a) Using information from the table, place the metals in order of **increasing** reactivity. The first one has been done for you.

copper

least reactive

↓

most reactive

[2]

(b) (i) What colour is the flame produced when sodium burns?

_____ [1]

(ii) Complete the word equation for the reaction of sodium with water.

.

sodium + water ⟶ [ ] + [ ]

[2]

(c) Using information from the table, suggest why copper replaced lead for making water pipes in houses.

_____

_____ [1]

(d) The formula of copper carbonate is $CuCO_3$.

(i) How many different elements does copper carbonate $CuCO_3$ contain?

_____ [1]

(ii) What is the total number of atoms represented by the formula $CuCO_3$?

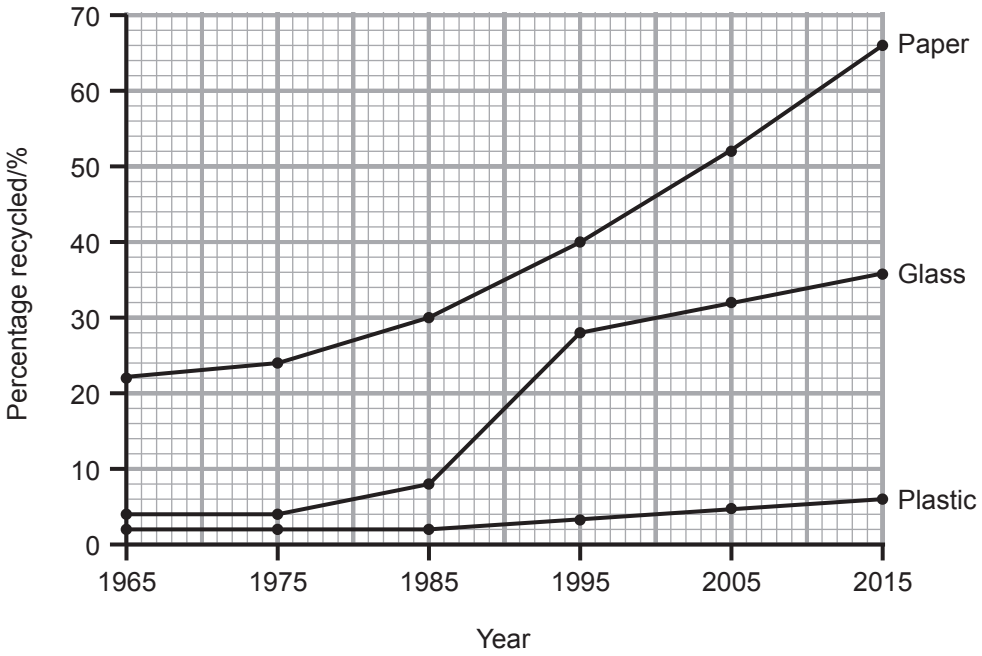
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

7 **(a)** The graph below shows the percentage of plastic, glass and paper recycled in a country between the years 1965 to 2015.



Source: Principal Examiner

(i) Which material shows the biggest percentage increase between the years **1985** to **1995**?

_____ [1]

(ii) Calculate the percentage increase for paper recycling from **1965** to **2015**.

(Show your working out.)

_____ % [2]

(iii) Describe the steps in recycling glass after it has been delivered to a factory.

_____

_____

_____

_____

_____

_____ [3]

(b) Waste that does not get recycled often ends up in landfill sites.



© Ashley Cooper / Science Photo Library

Waste items found in landfill include: aluminium cans, food waste, glass bottles, newspapers and plastic bags. Many items will remain in landfill sites for hundreds of years. Some of the waste gives off polluting gases and can produce foul-smelling liquids that leak into water supplies. A recent survey suggests that many new landfill sites need to be found each year due to the large volume of waste being produced.

Use **only** the information provided to answer parts **(i)** and **(ii)** below.

(i) Apart from food waste, suggest **one** other material which is biodegradable.

_____ [1]

(ii) Suggest **two** disadvantages of living near a landfill site.

1. _____

2. _____ [2]

(c) Some materials are non-biodegradable. Explain fully the term 'non-biodegradable'.

_____

_____ [2]

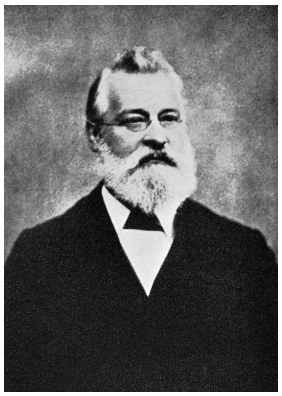
(d) Suggest **one** way local authorities can encourage people to recycle more waste.

_____ [1]

Examiner Only	
Marks	Remark

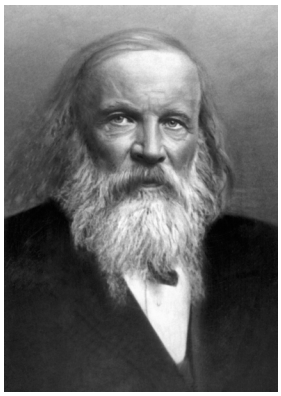
Examiner Only	
Marks	Remark

8 Early work on the Periodic Table began in the 19th century. In 1864 John Newlands placed the 62 known elements into his periodic table. This was further developed in 1869 by Dmitri Mendeleev.



John Newlands

© Science Photo Library



Dmitri Mendeleev

© Sputnik / Science Photo Library

Describe the work of these two scientists in the development of the Periodic Table.

Your answer should include:

- Newlands' ideas
- Mendeleev's improvements
- the name of the Group of unreactive elements not included in Mendeleev's table.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark

9 **(a)** Some tap water contains dissolved metal ions which can make it hard.

(i) Give the name of **one** metal ion that causes tap water to be hard.

_____ [1]

(ii) Give **one** advantage and **one** disadvantage of hard water.

Advantage _____

_____

Disadvantage _____

_____ [2]

(b) The hardness of three samples of water **X**, **Y** and **Z** was measured using soap solution. New samples were boiled and the experiment repeated.
The results are shown below.

Sample of water	Volume of soap solution needed to form a permanent lather/cm^3	
	Before boiling	After boiling
X	2	2
Y	17	17
Z	13	2

State the type of water in samples **Y** and **Z**. Explain your answers.

(i) Sample **Y** _____

_____

_____ [2]

(ii) Sample **Z** _____

_____

_____ [2]

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THIS IS THE END OF THE QUESTION PAPER

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SYMBOLS OF SELECTED IONS

Positive ions

Name	Symbol
Ammonium	NH_4^+
Chromium(III)	Cr^{3+}
Copper(II)	Cu^{2+}
Iron(II)	Fe^{2+}
Iron(III)	Fe^{3+}
Lead(II)	Pb^{2+}
Silver	Ag^+
Zinc	Zn^{2+}

Negative ions

Name	Symbol
Carbonate	CO_3^{2-}
Dichromate	$Cr_2O_7^{2-}$
Ethanoate	CH_3COO^-
Hydrogen carbonate	HCO_3^-
Hydroxide	OH^-
Methanoate	$HCOO^-$
Nitrate	NO_3^-
Sulfate	SO_4^{2-}
Sulfite	SO_3^{2-}

SOLUBILITY IN COLD WATER OF COMMON SALTS, HYDROXIDES AND OXIDES

Soluble
All sodium, potassium and ammonium salts
All nitrates
Most chlorides, bromides and iodides EXCEPT silver and lead chlorides, bromides and iodides
Most sulfates EXCEPT lead and barium sulfates Calcium sulfate is slightly soluble

Insoluble
Most carbonates EXCEPT sodium, potassium and ammonium carbonates
Most hydroxides EXCEPT sodium, potassium and ammonium hydroxides
Most oxides EXCEPT sodium, potassium and calcium oxides which react with water

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Rewarding Learning

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DATA LEAFLET

For the use of candidates taking
Science: Chemistry,
Science: Double Award
or Science: Single Award

Copies must be free from notes or additions of any kind. No other type of data booklet or information sheet is authorised for use in the examinations.

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Symbols of Selected Ions 4
Solubility of Common Salts 4

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THE PERIODIC TABLE OF ELEMENTS

Group

1	2											3	4	5	6	7	0
							1 H Hydrogen 1										4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	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	64 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	99 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	128 Te Tellurium 52	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	210 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	263 Sg Seaborgium 106	262 Bh Bohrium 107	265 Hs Hassium 108	266 Mt Meitnerium 109	269 Ds Darmstadtium 110	272 Rg Roentgenium 111	285 Cn Copernicium 112						

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	147 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	242 Pu Plutonium 94	243 Am Americium 95	247 Cm Curium 96	245 Bk Berkelium 97	251 Cf Californium 98	254 Es Einsteinium 99	253 Fm Fermium 100	256 Md Mendelevium 101	254 No Nobelium 102	257 Lr Lawrencium 103

* 58 – 71 Lanthanum series
† 90 – 103 Actinium series

a
b x

a = relative atomic mass (approx)
x = atomic symbol
b = atomic number

Rewarding Learning

General Certificate of Secondary Education
2016–2017

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

THURSDAY 10 NOVEMBER 2016, MORNING

MARK SCHEME

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General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

1 **(a)**

Common substance	Universal indicator colour	pH number
toothpaste	blue	**10** [1]
lemon juice	**orange** [1]	4
oven cleaner	purple	**14** [1]

[3]

(b) Weak acid [1]

(c) 7 [1]

AVAILABLE MARKS: 5

2 **(a)** Hazard [1]

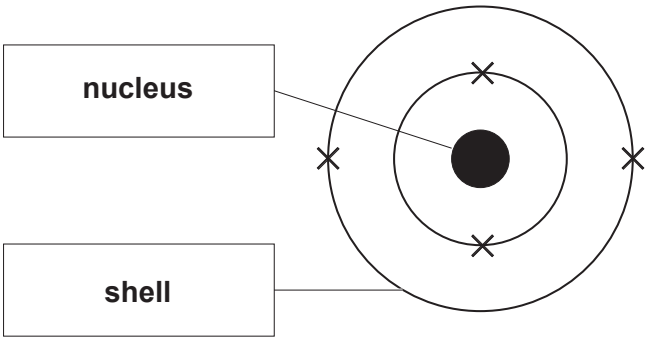
(b) Explosive [1]

(c) Symbols are more eye catching/understood in any language/ understood by people who cannot read [1]

(d) Can poison [1]

AVAILABLE MARKS: 4

3 **(a)**



[2]

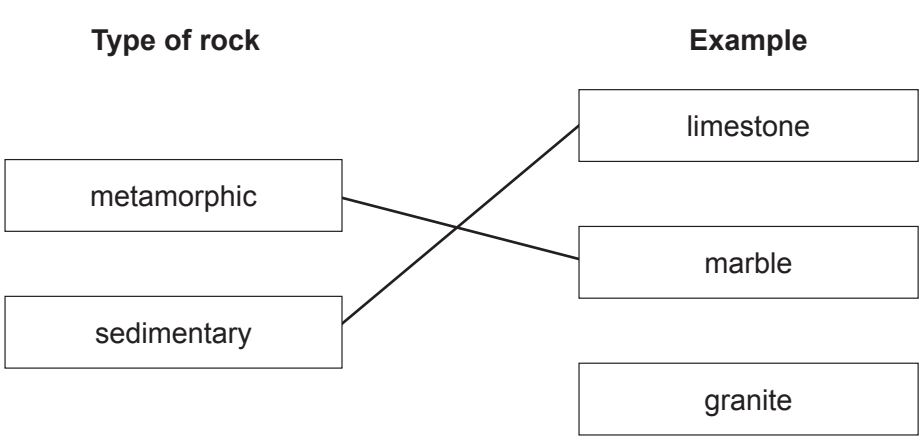
(b) Positive [1]
one [1] [2]

(c) A [1]

(d) 76 [1]
100 – 76 = 24 [1] [2]

AVAILABLE MARKS: 7

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				AVAILABLE MARKS
4	**(a)**		[2]	
	(b)	**(i)** Correctly labelled magma chamber	[1]	
		(ii) 7	[1]	
		(iii) Igneous	[1]	
	(c)	Richter (scale)	[1]	6
5	**(a)**	**(i)** 2 points plotted correctly [1] 3 points plotted correctly [2] line of best fit correctly drawn [1]	[3]	
		(ii) As atomic number increases melting point decreases	[1]	
	(b)	Alkali metals	[1]	5
6	**(a)**	Lead, zinc, magnesium and sodium [2] any **two** in correct order [1]	[2]	
	(b)	**(i)** Yellow/orange	[1]	
		(ii) Sodium hydroxide [1] hydrogen [1] either order	[2]	
	(c)	Copper does not react with hot water (or steam)/converse for lead	[1]	
	(d)	**(i)** Three	[1]	
		(ii) Five	[1]	8

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7 **(a)** **(i)** Glass [1]

(ii) 66 – 22 [1]
44% [1] [2]

(iii) Reprocessing of cullet/broken **into pieces**/crushed [1]
use furnace/melt [1]
remould/reshaped/reformed [1] [3]

(b) **(i)** Newspaper [1]

(ii) Any **two** from:
- (waste) giving off polluting gases
- foul smelling liquid
- liquid can leak into water supplies
- eyesore [2]

(c) Cannot be broken down [1] by microbes [1] [2]

(d) Provide **special** bins/advertising in newspapers, magazines and on television/education in schools/fines or rewards or other suitable [1]

AVAILABLE MARKS

12

8 **Indicative Content:**
- Newlands developed the law of octaves
- Each eighth element was similar
- Newlands put two elements in one box
- Newlands/Mendeleev ordered the elements according to mass number/ atomic mass
- Mendeleev ordered the elements into groups or periods
- Mendeleev separated metals and non metals
- Mendeleev left gaps for undiscovered elements
- Mendeleev predicted properties of elements yet to be discovered/ Mendeleev more elements
- Noble gases not discovered in 1869

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the work of Newlands and Mendeleev using **5–8** of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe **3 or 4** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe the work of Newlands and Mendeleev using **1 or 2** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Not worthy of credit.	[0]

[6]

6

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				AVAILABLE MARKS
9	(a)	(i)	Calcium/magnesium [1]	
		(ii)	Advantages: better taste/stronger teeth or bones/reduces risk of heart disease [1] Disadvantages: causes 'fur' on kettles/limescale in pipes/stains clothing/ block pipes/cost qualified (e.g. replace kettles/more energy) [1] [2]	
	(b)	(i)	Water Y is permanent hard water [1] there was still **a lot** of soap solution needed to form a lather after boiling [1] [2]	
		(ii)	Water Z is temporary hard water [1] the **volume of soap** required to form a lather decreased after boiling [1] [2]	7
			Total	**60**

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015–2016

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

GSS21

THURSDAY 19 MAY 2016, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in blue or black ink only. **Do not write with a gel pen.**
Answer **all eleven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **7**.
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 included in this question paper.

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1 **(a)** Given below are some hazard symbols and their names. Using lines, match each symbol to its name.

One has been done for you.

Symbol	Name
	corrosive
	flammable
	toxic
	explosive

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[2]

(b) Given below is information about three household substances. Complete the table.

Choose from:

citric acid : ethanoic acid : sodium hydroxide

Household substance	Chemical name
cleaning products	ammonia
oven cleaner	
vinegar	

[2]

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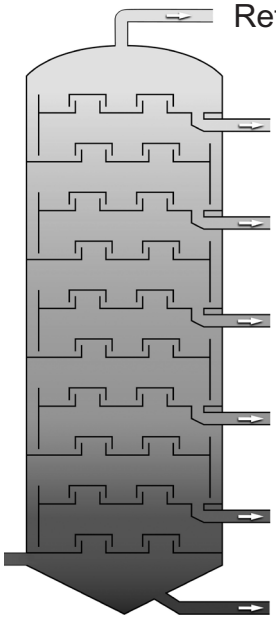
2 **(a)** Complete the following sentences about crude oil.

Crude oil is a fossil fuel. It is formed from plants and animals that died millions of years ago. Crude oil is a _____ of many different hydrocarbons. Hydrocarbons are compounds that contain only the elements _____ and _____. [3]

(b) Crude oil is separated into different chemicals by fractional distillation. Complete the diagram below about the different fractions of crude oil and their uses.

Choose from:

paraffin **bitumen** **petrol**



Refinery gas used for fuel in gas ovens

_____ used as fuel in cars

Naphtha used for making chemicals

_____ used for fuel in jet engines

Diesel used as fuel in cars and lorries

Fuel oil used for central heating

_____ used for road surfaces

[2]

© Science Photo Library

(c) What difference between each fraction allows them to be separated using the method shown above? Circle the correct answer.

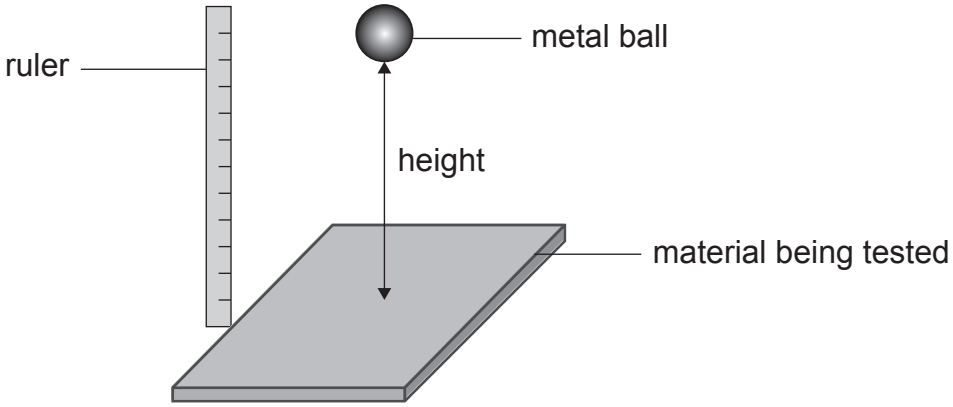
melting point : **freezing point** : **boiling point**

[1]

[Turn over

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3 A student investigated the strength of four different materials using the apparatus shown below.



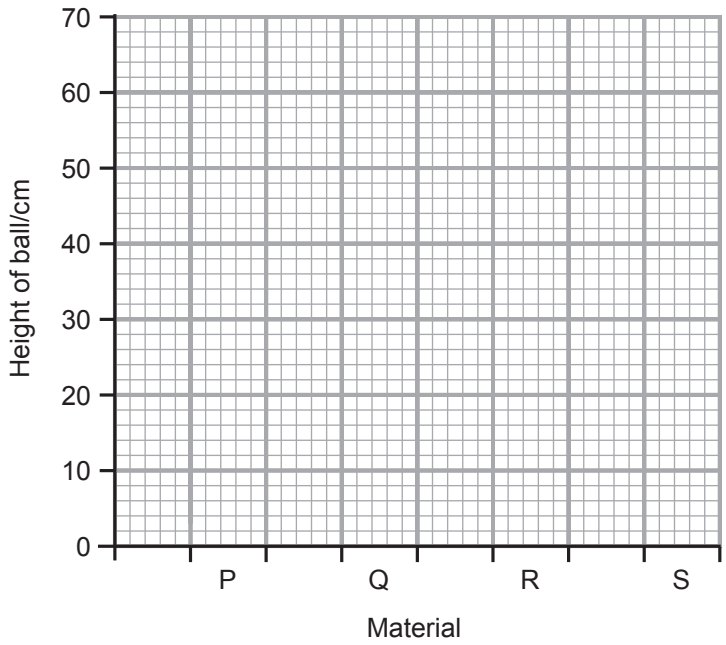
Source: Principal Examiner

The height the ball was dropped from was increased until the material cracked when hit.
The results are shown below.

Material	Height of ball/cm
P	44
Q	32
R	65
S	24

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(a) Use the information in the table to complete the bar chart below.



[2]

(b) Which material (**P**, **Q**, **R** or **S**) is the strongest?

_____ [1]

(c) Give **two** things the student needed to do to make this investigation a fair test.

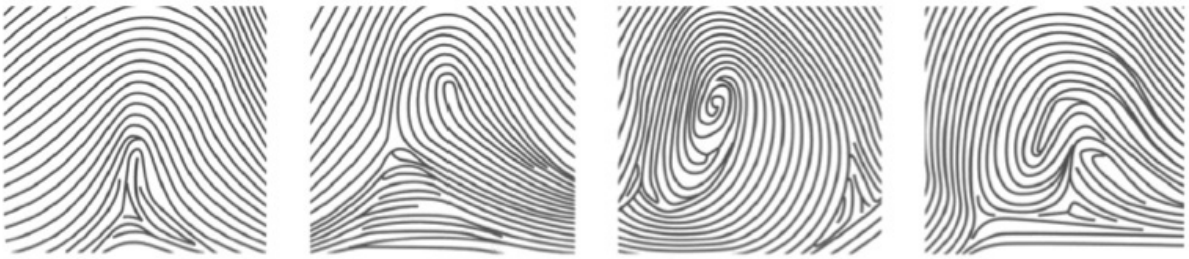
1. _____

2. _____ [2]

[Turn over

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4 Four types of fingerprints used by forensic scientists are shown below.



A **B** **C** **D**

© GCSE Science Single Award for CCEA: Foundation and Higher Tier by James Napier, Alyn McFarland and Roy White. (ISBN: 9781444195729) "Reproduced by permission of Hodder Education".

(a) Which of the fingerprints (**A**, **B**, **C** or **D**) is:

1. an 'arch' type? _____

2. a 'whorl' type? _____ [2]

(b) Forensic scientists also use flame tests. The steps to carry out a flame test are shown below but they are **not** in the correct order.

W Then dip the flame test rod into the test material and put into the blue Bunsen flame.

X Clean the flame test rod by dipping it into acid and heating it in a blue Bunsen flame.

Y Repeat the cleaning process until there is no colour change.

Z Record the colour of the flame produced.

Using the letters **W**, **X**, **Y** and **Z**, give the correct order.

Order _____ _____ _____ _____ [2]

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(c) A flame test is used to identify the metal ion present in a substance by producing a colour in the Bunsen flame.

Complete the table below.

Metal ion	Flame colour
copper	blue-green
potassium	
	orange/yellow

[2]

[Turn over

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5 The table below shows some properties of five different plastics.

Plastic	Properties
A	tough, fairly hard, light, good water resistance
B	tough, heavy, not flexible, good electrical insulator
C	tough, not flexible, light, good resistance to chemicals, good electrical insulator
D	shatters easily, hard, light, good resistance to chemicals
E	tough, soft, light, very flexible, good resistance to chemicals, good electrical insulator

Use this information to answer the following questions.

(a) Which plastic (**A**, **B**, **C**, **D** or **E**) would be best for making a toy boat? Give the **most** important reason for your choice.

_____

_____ [2]

(b) Which plastic (**A**, **B**, **C**, **D** or **E**) would be best for making a container for carrying acid? Explain your choice.

_____

_____

_____ [2]

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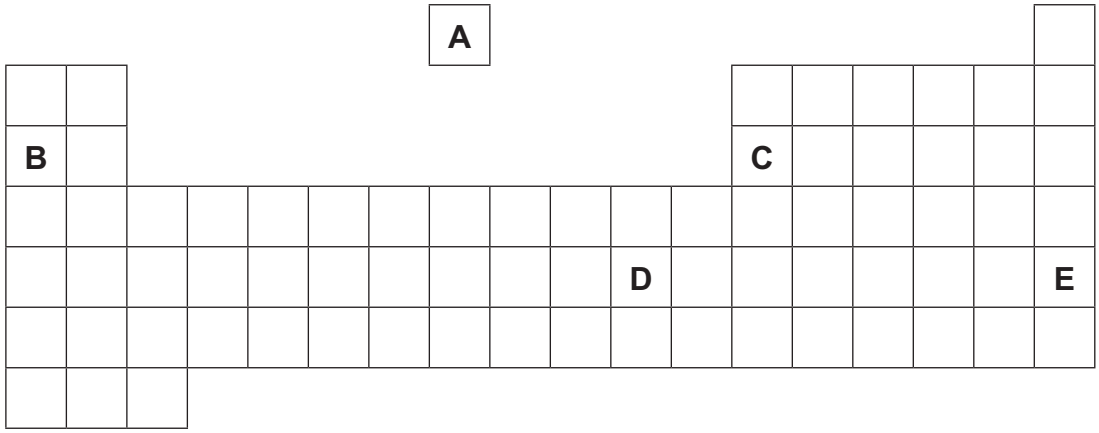
(c) Low density polythene is used to make plastic shopping bags and to cover electrical cables.
Suggest which of the plastics (**A**, **B**, **C**, **D** or **E**) could be low density polythene.

_____ [1]

[Turn over

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6 Below is an outline of the Periodic Table showing the position of some elements.



You may find your Data Leaflet helpful to answer the questions below.

(a) Place an **X** in any position where you would find an alkaline earth metal. [1]

(b) Which element (**A**, **B**, **C**, **D** or **E**) is:

1. sodium? _____
2. a noble gas? _____
3. in the same Group as boron? _____ [3]

(c) Complete the following sentence to describe a **trend** in the Periodic Table.

The metallic character of the elements _____ from left to right across the Periodic Table. [1]

7 Describe why and how earthquakes occur.

Your answer should include:

- an explanation of the process;
- the name of the scale used to measure earthquakes and what the readings tell us about earthquakes.

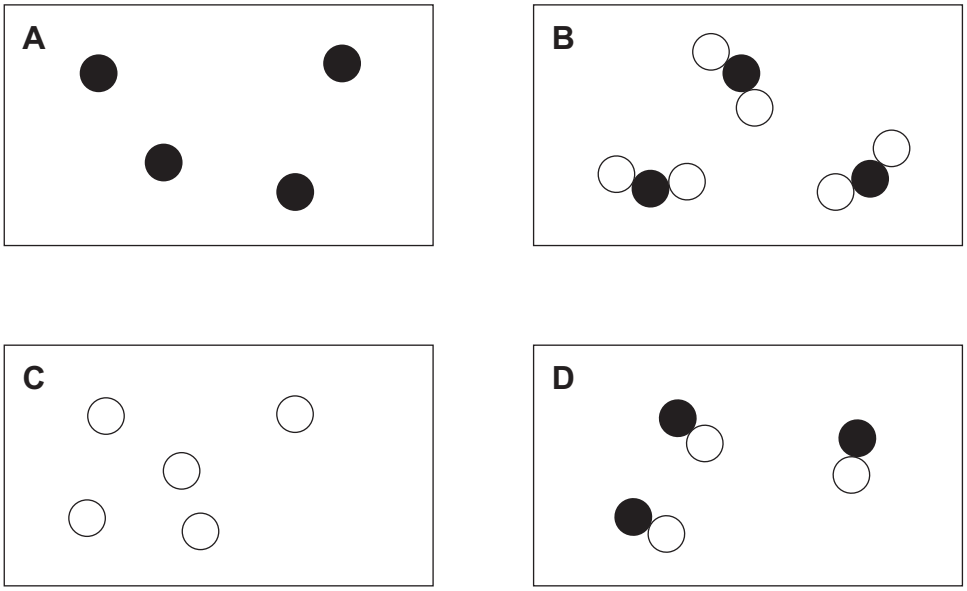
In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

[Turn over

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8 Below are some particle diagrams. They represent elements or compounds.



(a) Which of the diagram(s) (**A**, **B**, **C** or **D**) show elements? Explain your answer.

Diagram(s) _____

_____

_____ [2]

(b) Suggest which diagram (**A**, **B**, **C** or **D**) could represent the compound carbon monoxide (CO).

_____ [1]

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9 **(a)** The table below gives information about five hydrocarbon molecules.

Molecule	Number of carbon atoms	Melting point/°C	Boiling point/°C	Energy released per gram when burned/kJ
methane	1	– 182	– 162	56
ethane	2	– 183	– 89	52
propane	3	– 188	– 42	51
butane	4	– 138	0	50
pentane	5	– 130	36	49

(i) Calculate the energy released when 100 grams of propane is burned.

_____ kJ [1]

(ii) Calculate the difference between the melting points of the molecules with the most and least carbon atoms.

_____ °C [1]

(iii) Describe the trend between the number of carbon atoms and a molecule's boiling point.

_____

_____ [1]

(b) Complete the word equation below for the burning of propane.

propane + [ ] → carbon dioxide + water [1]

[Turn over

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10 The table below gives information about three different indicators and their colours at different pH values.

Indicator \ pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14
methyl purple	P	P	P	P	G	G	G	G	G	G	G	G	G	G
thymol blue	Y	Y	Y	Y	Y	Y	Y	Y	B	B	B	B	B	B
indigo carmine	B	B	B	B	B	B	B	B	B	B	B	Y	Y	Y

Key: B = blue G = green P = purple Y = yellow

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

(a) What colour is:

1. methyl purple indicator in a strong acid? _____

2. indigo carmine indicator in sodium hydroxide? _____ [2]

(b) A scientist is going to add an acid to an alkali. He needs to stop adding the acid when the pH value is 7.

(i) What name is given to this **type** of reaction?

_____ [1]

(ii) Explain fully why the scientist would **not** find any of the indicators in the table useful for his experiment.

_____

_____

_____ [2]

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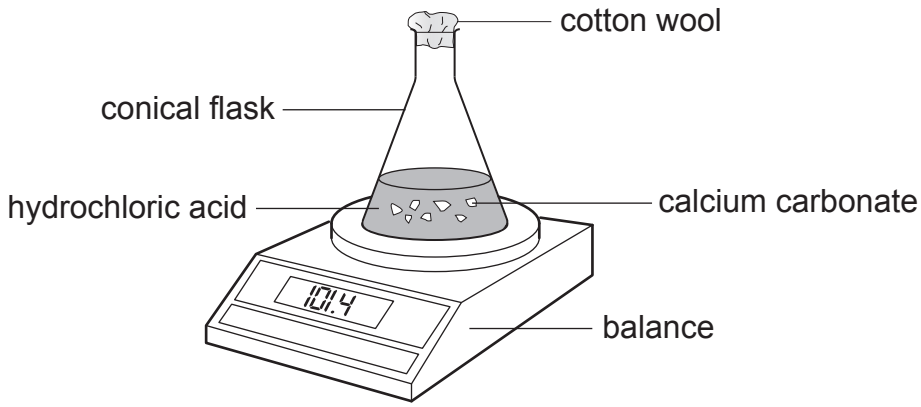
(c) Most indicators are made from plants. Describe how you would obtain an indicator from red cabbage.

[3]

[Turn over

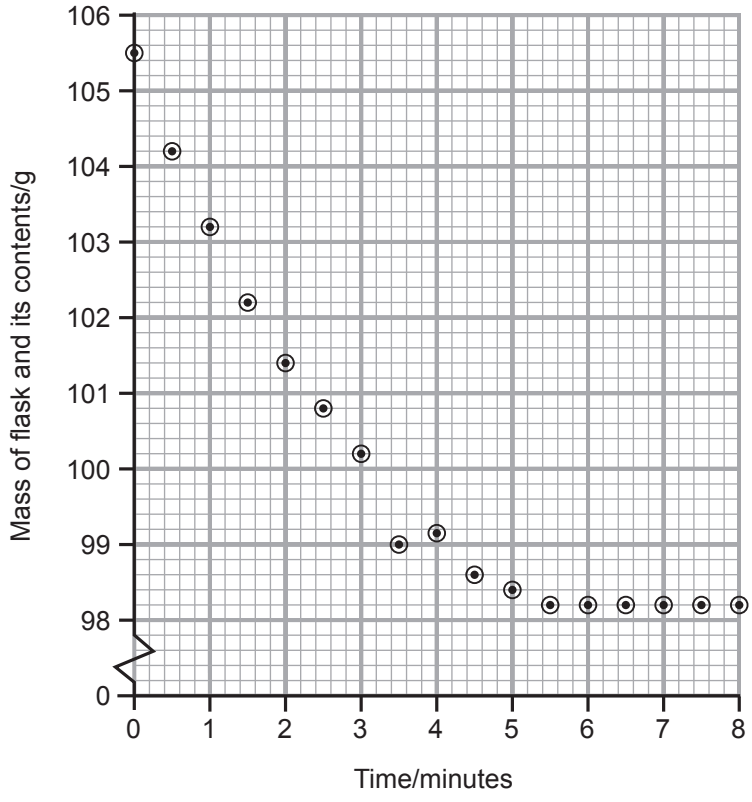
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11 A student investigated the amount of carbon dioxide released during the reaction between hydrochloric acid and calcium carbonate. He used the apparatus shown below.



© Principal Examiner

The student measured the mass of the flask and its contents for 8 minutes. The results are shown in the graph below.



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(a) Complete the graph opposite by adding a curve of best fit ignoring any anomalous results. [1]

(b) Describe fully the trend shown in the graph.

_____

_____

_____ [2]

(c) Complete the word equation for this reaction.

hydrochloric acid + calcium carbonate → ☐ + ☐ + carbon dioxide

[2]

(d) **(i)** Name the chemical used to test for carbon dioxide.

_____ [1]

(ii) Describe the colour change during this test for carbon dioxide.

_____

_____ [2]

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Question Number	**Marks**
1	
2	
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7	
8	
9	
10	
11	
Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
2015–2016

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

THURSDAY 19 MAY 2016, MORNING

MARK SCHEME

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General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

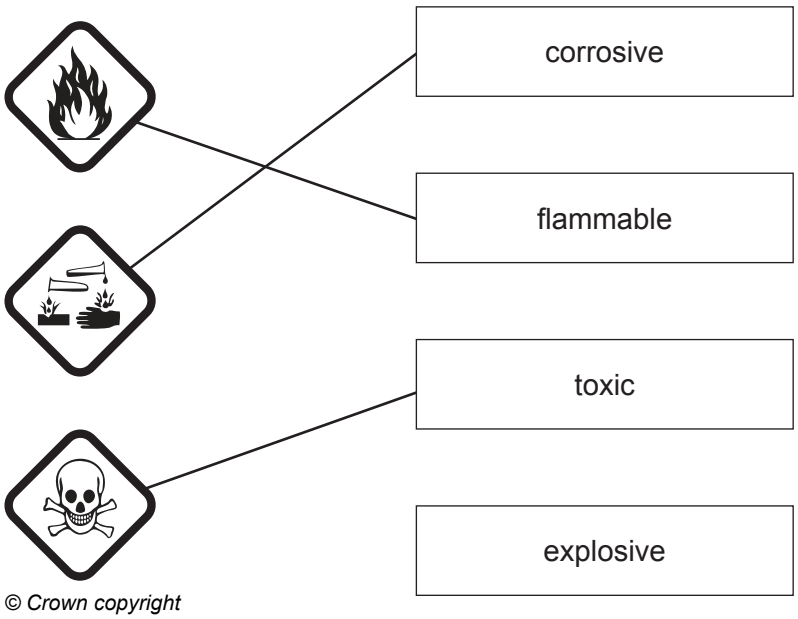
Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

			AVAILABLE MARKS
1	(a)	© Crown copyright [2]	

(b)

Household substance	Chemical name
cleaning products	ammonia
oven cleaner	sodium hydroxide [1]
vinegar	ethanoic acid [1]

[2] 4

2 **(a)** Mixture [1]
carbon [1]
hydrogen [1] } either order [3]

(b) Petrol, paraffin, bitumen
(all correct [2], two or one correct [1]) [2]

(c) Boiling point [1] 6

3 **(a)** All bars correct [2]
(only one error award [1]) [2]

(b) R [1]

(c) Any **two** from:
- same mass of ball } use same ball
- same metal for ball
- same thickness of material

any other appropriate response [2] 5

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				AVAILABLE MARKS
4	**(a)**	A [1] C [1]	[2]	
	(b)	X Y W Z (Any two in correct order [1])	[2]	
	(c)	<table><tr><th>Metal ion</th><th>Flame colour</th></tr><tr><td>copper</td><td>blue-green</td></tr><tr><td>potassium</td><td>lilac [1]</td></tr><tr><td>sodium [1]</td><td>orange/yellow</td></tr></table>	[2]	6
5	**(a)**	A [1] It has good water resistance [1]	[2]	
	(b)	C [1] tough/not flexible/light and **resistant to chemicals** [1]	[2]	
	(c)	E	[1]	5
6	**(a)**	X placed in any position in Group 2	[1]	
	(b)	B [1] E [1] C [1]	[3]	
	(c)	Decreases	[1]	5

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AVAILABLE MARKS

7 **Indicative content:**

- **tectonic plate** (theory)
- earthquakes happen at plate **boundaries**
- earthquakes are caused by a **build-up** of pressure
- earthquakes are caused by **sudden** movement of plates
- earthquakes can happen as plates move past each other/collide
- the **Richter scale** (measures the size of earthquakes)
- the larger the Richter scale value the more intense the earthquake is

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe earthquakes using **six or seven** of the points above, in a logical sequence including the term plate tectonics. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe earthquakes using **four or five** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe earthquakes using **one, two or three** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

8 **(a)** A and C [1]
they only contain one **type of atom** [1] [2]

(b) D [1] 3

9 **(a)** **(i)** 5100 [1]

(ii) 52 [1]

(iii) As the number of carbon atoms increases the boiling point increases [1]

(b) Oxygen [1] 4

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			AVAILABLE MARKS
10	**(a)**	Purple [1] yellow [1] [2]	
	(b)	**(i)** Neutralisation [1]	
		(ii) None of the indicators **change colour at pH7**/point of neutralisation [1] they remain the same colour in **pH8 and pH7** [1] [2]	
	(c)	(Cut up the cabbage) and **add water** [1] **boil/heat** until (water changes colour) [1] (filter/decant) the **coloured solution to use as the indicator** [1] [3]	8
11	**(a)**	Smooth curve drawn, ignoring anomalous point [1]	
	(b)	At the start the **mass** of the flask and contents decreased with time [1] from 5.5 minutes the mass of the flask and contents remained constant [1] [2]	
	(c)	Calcium chloride [1] water [1] (either order) [2]	
	(d)	**(i)** Limewater [1]	
		(ii) Turns from **colourless** [1] to **cloudy/milky** [1] [2]	8
		Total	**60**

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015–2016

Science: Single Award

Unit 2 (Chemistry)
Foundation Tier

GSS21

[GSS21]

THURSDAY 25 FEBRUARY 2016, MORNING

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 eleven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **9**.
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 included for your use.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
Total Marks	

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Examiner Only	
Marks	Remark

1 The hazard symbol below was found on a lorry carrying methylated spirit.



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(a) Name the hazard symbol shown above.

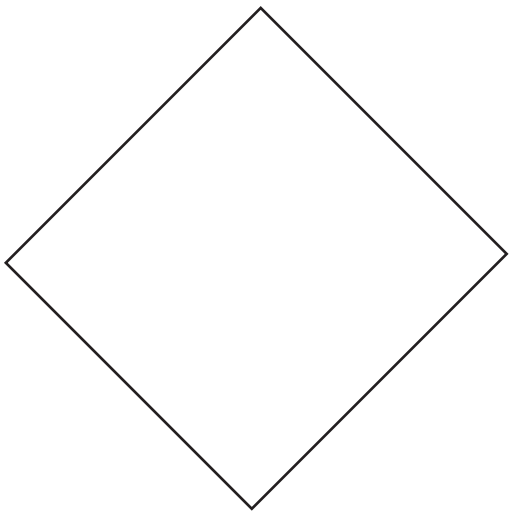
_____ [1]

(b) Hazard symbols warn of danger. Give **one** reason why symbols are used and not just words.

_____

_____ [1]

(c) In the space below, draw the hazard symbol for a **toxic** substance.



[1]

Examiner Only	
Marks	Remark

2 **(a)** The pH scale is shown below.

1	2	3	4	5	6	7	8	9	10	11	12	13	14

(i) Suggest a pH value for stomach acid.

_____ [1]

(ii) What is the pH number of a neutral substance?

_____ [1]

When a wasp stings, it leaves an alkali in the wound.



© F. Martinez Clavel / Science Photo Library

(b) Name a substance which could be **safely** used to neutralise the alkali.

Circle the correct answer.

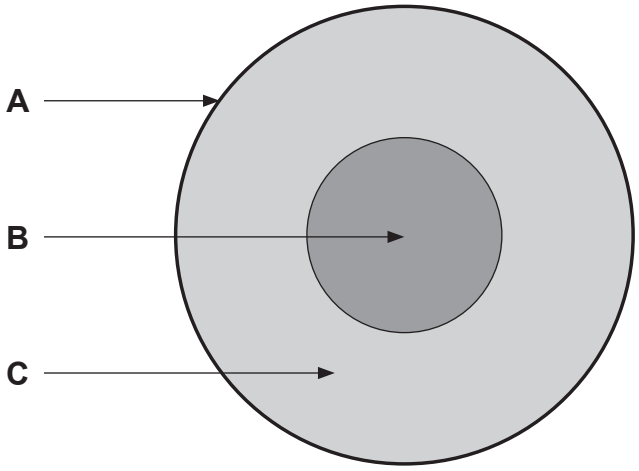
toothpaste : **hydrochloric acid** : **vinegar**

[1]

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Examiner Only	
Marks	Remark

3 Below is a diagram of the structure of the Earth.



(a) Complete the table below to match each layer to its correct name.

Choose from:

core **mantle** **nucleus** **crust**

Layer	Name
A	
B	
C	

[3]

(b) Complete the following sentence.

The surface of the Earth contains three types of rock; these are called igneous, sedimentary and _____. [1]

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(Questions continue overleaf)

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4 Garden furniture is often made from plastic.



© venusphoto / iStock / Thinkstock

(a) Suggest **one** property that makes plastic a suitable material for making garden furniture. Explain why this property makes it suitable.

_____

_____

_____ [2]

(b) Wood can also be used to make garden furniture. It absorbs water, is easily available, and can be cut into many shapes.

Using the information above, give **one** disadvantage of using wood to make garden furniture. Explain your answer.

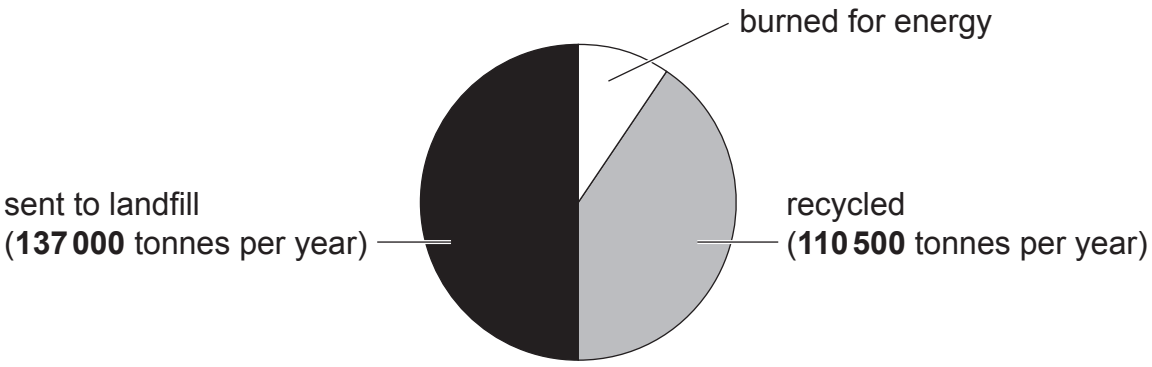
_____

_____

_____ [2]

Examiner Only	
Marks	Remark

The pie chart below shows three methods used in the UK to dispose of waste plastic.



In the UK a total of **275 000** tonnes of waste plastic is disposed of each year.

(c) Calculate the amount of waste plastic that is burned for energy each year.

(Show your working out.)

_____ tonnes [2]

(d) Given below is information about three types of fibres used to make clothing.

Type of fibre	Strength	Keeps its shape	Weight	Ability to absorb water	Biodegradable
Cotton	average	no	heavy	good	yes
Nylon	very strong	yes	light	average	no
Polyester	strong	yes	very light	poor	no

(i) Name the natural fibre shown in the table above.

_____ [1]

(ii) Which fibre would be the best to use in the manufacture of raincoats? Choose **two** properties from the table to support your answer.

Fibre _____

Property 1 _____

Property 2 _____ [2]

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Marks	Remark

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Examiner Only	
Marks	Remark

5 **(a)** Given below are the steps a student used to test for hard water. They are **not** in the correct order.

A Stop adding soap solution when a permanent lather forms

B Add 5 cm^3 of soap solution and shake well

C Measure 25 cm^3 of water into a conical flask

D Record the volume of soap used to form a permanent lather

E Continue adding soap solution 5 cm^3 at a time

(i) Using the letters **A**, **B**, **C**, **D** and **E** put the steps in the correct order. The first one has been done for you.

C _____ _____ _____ _____ _____ [2]

(ii) Suggest why the student shakes the water samples after adding soap solution.

_____ [1]

(iii) Apart from taste, give **one** advantage of drinking hard water.

_____ [1]

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(b) Water can be hard or soft; and hard water can be temporary or permanent.

Using lines, match each statement to the correct type of water.

Statement	Type of water
	Permanent hard water
Easily makes a lather with soap	
	Temporary hard water
Can be softened by boiling	
	Soft water

[2]

(c) Name **one** chemical compound which causes temporary hardness in water.

_____ [1]

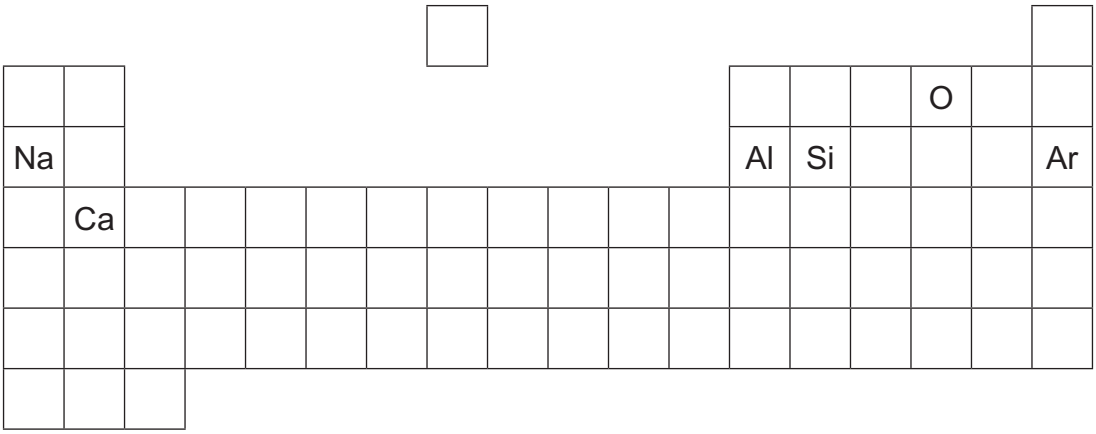
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 The positions and chemical symbols of six elements in the Periodic Table are shown below.



(a) Using **only** the symbols given, identify the element from the descriptions below.

(i) A lightweight metal used in aeroplanes.

_____ [1]

(ii) A metal with properties similar to those of lithium (Li).

_____ [1]

(iii) A noble gas.

_____ [1]

(b) A student adds a metal to water, it floats and burns with a lilac flame. On the Periodic Table above use the letter **X** to show the position of this metal. [1]

(c) Beryllium is in Group 2 of the Periodic Table.
Which **one** of these statements is correct for beryllium?
Tick (✓) the correct box.

Statement	Tick
it is a halogen	
it belongs to the same Period as oxygen	
it is a compound	

[1]

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(Questions continue overleaf)

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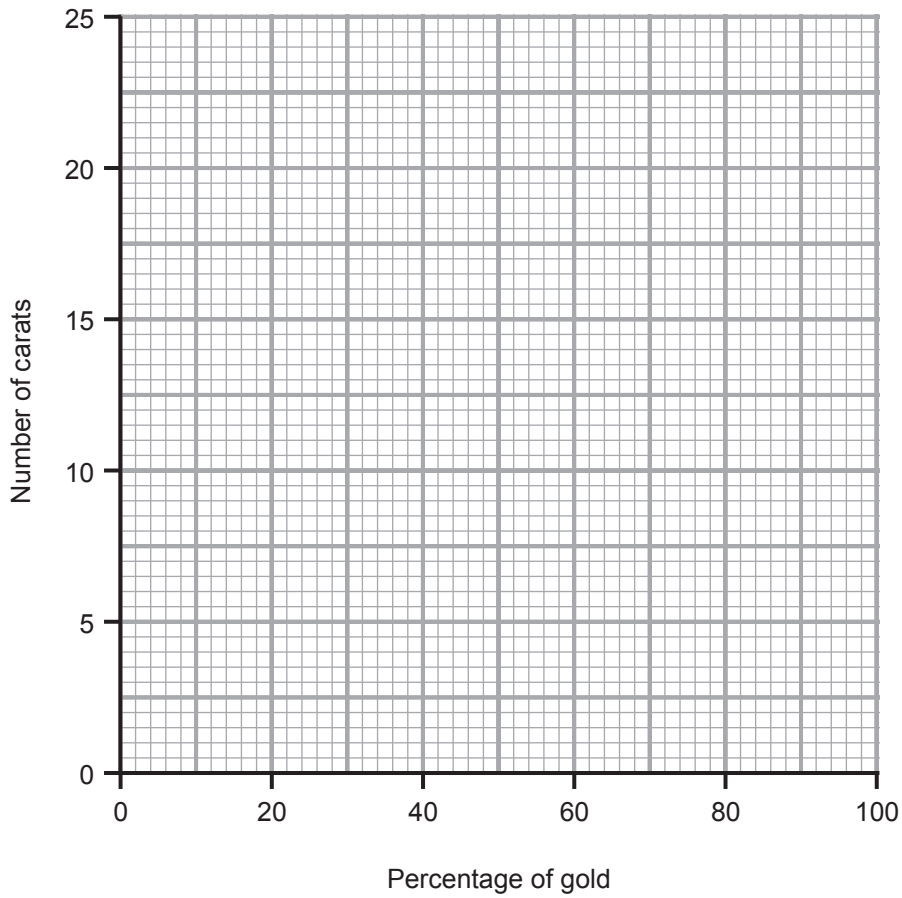
Examiner Only	
Marks	Remark

7 **(a)** Gold is a metal element used in jewellery. The purity of gold is often measured in carats.

The table below shows how the number of carats is related to the percentage of gold.

Percentage of gold	Number of carats
100	24
92	22
75	18
38	9

(i) On the grid below plot and draw a line graph for this information.



[2]

(ii) State the trend shown by this information.

_____

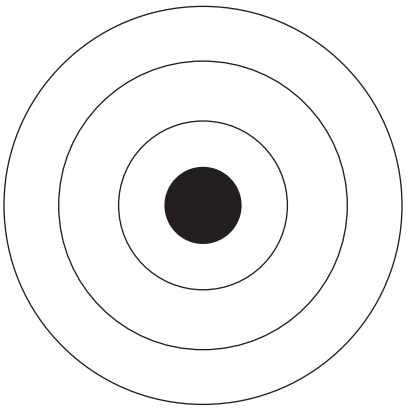
_____ [1]

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(iii) Use the graph to find the percentage of gold in a 14 carat gold ring.

_____ % [1]

(b) Aluminium is often added to gold in jewellery. An atom of aluminium has 13 electrons. Complete the diagram below to show how all these electrons are arranged.



[1]

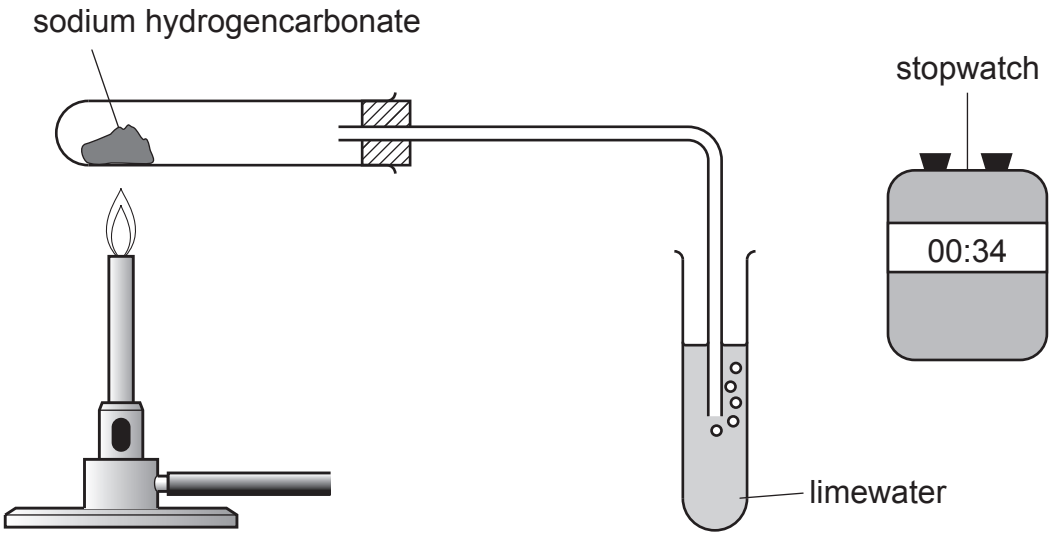
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

8 Sarah investigated the effect of heating a **small** amount of sodium hydrogencarbonate using the apparatus shown below.



Sarah's observations are shown in the table below.

Time interval/ seconds	Observations
0 to 30	Small number of gas bubbles observed in limewater. The limewater remained colourless
31 to 60	A large number of gas bubbles. The limewater turned cloudy
61 to 90	No bubbles

(a) In this investigation:

(i) name the gas produced.

_____ [1]

(ii) name the type of reaction that produced this gas.

_____ [1]

(b) Suggest **one** reason for Sarah's observations between 0 and 30 seconds.

_____

_____ [1]

(c) Explain fully Sarah's observation between 61 and 90 seconds.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

9 The fingerprint shown below was found on the door of a stolen black car.

Examiner Only	
Marks	Remark



© Science Source / Science Photo Library

Describe how the fingerprint can be taken from the black car and kept as evidence.

Your answer should include:

- the type of fingerprint shown above,
- why the fingerprint may be useful in helping solve the crime.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark

10 The reactivity of three metals, copper, zinc and magnesium, was investigated by adding a small amount of each to sulfate solutions of the other metals.

Some results are shown below.

If there was a reaction a tick (✓) was used; for no reaction a cross (✗) was used.

Solution / Metal	Copper sulfate	Zinc sulfate	Magnesium sulfate
Copper		✗	
Zinc			
Magnesium		✓	

(a) Use your knowledge of the reactivity series to complete the table above. [2]

(b) Complete the word equation for the reaction between magnesium and zinc sulfate.

magnesium + zinc sulfate → _____ + _____

[2]

(c) Name this type of reaction.

_____ [1]

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11 The table shows some chemicals that can be separated from **one** barrel of crude oil.

Chemicals	Amount in one barrel/gallons
petrol	2.2
jet fuel	4.8
fuel oil	2.8
diesel	8.0
others	7.4

(a) Name the process used to separate crude oil into these different chemicals.

_____ [1]

(b) Name **one** other chemical that can be separated from crude oil.

_____ [1]

(c) A plane needs 4800 gallons of **jet fuel** for one journey. Calculate how many barrels of crude oil are needed for this journey.

(Show your working out.)

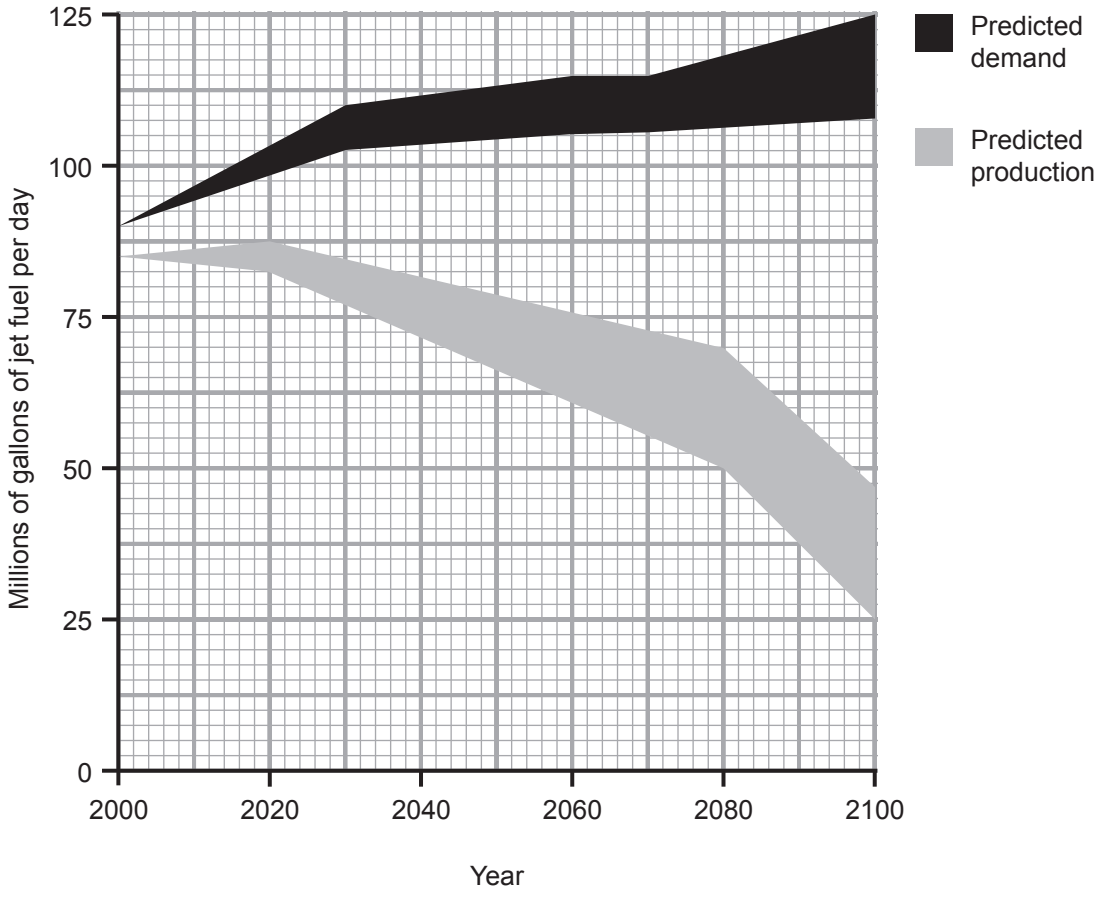
_____ [2]

Examiner Only

Marks	Remark

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The graph below shows the predicted demand for jet fuel. It also shows the predicted production of jet fuel from crude oil.



(d) Use the graph to explain why airline companies are investing large amounts of money to find alternative sources of fuel for their aircraft.

_____

_____

_____ [2]

(e) Suggest **two** reasons why these predictions may not be accurate.

1. _____

2. _____ [2]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only

Marks	Remark

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Rewarding Learning

General Certificate of Secondary Education
2015–2016

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

THURSDAY 25 FEBRUARY 2016, MORNING

MARK SCHEME

STEMUP.CO.UK

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

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				AVAILABLE MARKS
1	(a)	Flammable	[1]	
	(b)	Greater visual impact/eyecatching/internationally understood/ easier to understand/can't read	[1]	
	(c)	Toxic symbol  © Crown Copyright	[1]	3
2	(a)	(i) 1–3	[1]	
		(ii) 7	[1]	
	(b)	Vinegar	[1]	3
3	(a)		[3]	
	(b)	Metamorphic	[1]	4
4	(a)	Waterproof/light/easily shaped/hard/durable [1] correct explanation [1] If no property given award correct explanation	[2]	
	(b)	Absorbs water/not waterproof [1] garden furniture is often left outside/it may rain/it may rot [1]	[2]	
	(c)	27 500 – allow 2 marks without calculation (137 000 + 110 500 = 247 500 [1])	[2]	
	(d)	(i) Cotton	[1]	
		(ii) Polyester [1] polyester has a (poor) ability to absorb water and is very light [1] If Nylon and strong/light (award 1 mark)	[2]	9

Layer	Name
A	crust
B	core
C	mantle

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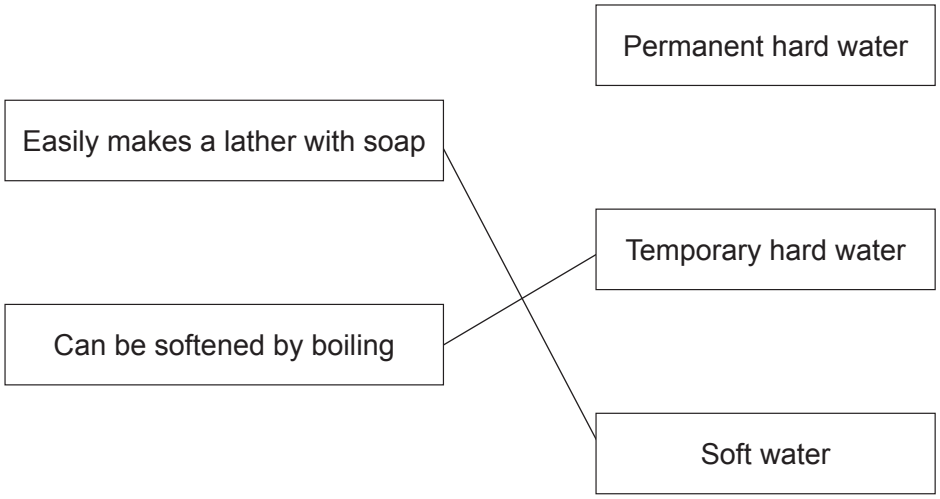
AVAILABLE MARKS

5 **(a)** **(i)** B E A D
any two in the correct order [1] [2]

(ii) To form a lather [1]

(iii) Stronger bones/teeth/prevents heart disease [1]

(b)



[2]

(c) Calcium/magnesium hydrogencarbonate [1] 7

6 **(a)** **(i)** Al [1]

(ii) Na [1]

(iii) Ar [1]

(b) **X** below Na (where potassium should be) [1]

(c)

Statement	Tick
It is a halogen	
It belongs to the same Period as oxygen	✓
It is a compound	

[1] 5

					AVAILABLE MARKS
7	**(a)**	**(i)**	All points plotted correctly [1] correct line of best fit [1] (not back to point 0,0) (mark line of best fit independently)	[2]	
		(ii)	As the percentage of gold increases the number of carats increases **or** opposite, not **they** both increase.	[1]	
		(iii)	58–59% or correct from graph	[1]	5
	(b)		2.8.3	[1]	
8	**(a)**	**(i)**	Carbon dioxide/CO_2	[1]	
		(ii)	Thermal decomposition	[1]	
	(b)		Reaction had not started/temperature was not high enough/ not enough carbon dioxide produced	[1]	
	(c)		Any **two** from: The reaction was finished [1] all the sodium hydrogencarbonate had reacted/only a small amount of sodium hydrogencarbonate was used [1] no more carbon dioxide/gas produced [1]	[2]	5

9 **Indicative Content:**

- add aluminium powder/talc
- sprinkle powder over print/dust/brush
- brush off any **excess** powder
- lift print with (clear) tape/cellotape
- place onto card/glass/any colour of card
- whorl print shown above/labelled on diagram
- fingerprints are unique/everyone has their own
- place criminal at crime scene/use a database

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout using **7 or 8** of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms using **4, 5 or 6** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe the lifting of a fingerprint method using **1, 2 or 3** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Not worthy of credit.	[0]

6

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			AVAILABLE MARKS
10	**(a)**		

Metal \ Solution	Copper sulfate	Zinc sulfate	Magnesium sulfate
Copper		✗	✗
Zinc	✓		✗
Magnesium	✓	✓	

half mark for each correct answer, rounded down [2]

(b) Magnesium sulfate [1]
zinc [1] (either order) [2]

(c) Displacement [1] — 5

11 **(a)** **Fractional** distillation [1]

(b) Refinery gas/naphtha/lubricating oil/tar (bitumen) [1]

(c) 4800/4.8 [1] 1000 [1] [2]

(d) Demand for jet fuel is increasing [1]
production of jet fuel is decreasing [1] [2]

(e) Any **two** from:
- the current values are estimates/guesses
- difficult to predict what will happen in the future/may be fewer planes
- more oil discovered
- other alternative answer, e.g. alternative fuels used/new fuel [2] — 8

Total — **60**

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015–2016

Science: Single Award

Unit 2 (Chemistry)
Foundation Tier

GSS21

[GSS21]

THURSDAY 12 NOVEMBER 2015, MORNING

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 eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **6**.
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 included for your use.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** Given below are three materials and some possible uses.
Using lines, match each material to **one** of its main uses.

Material	Use
plastic	 © Okea/ iStock/ Thinkstock aeroplane wings
copper	 © rgbdigital/ iStock/ Thinkstock bottom of saucepans
wool	 © digitalgenetics/ iStock/ Thinkstock clothing
	 © WestLight/ iStock/ Thinkstock shopping bags

[3]

Examiner Only	
Marks	Remark

(b) Some materials come from living things and are described as natural; others are man-made.
Place the following materials in the correct column of the table below.

wool **silk** **cotton** **nylon**

Natural	Man-made

[2]

(c) Most modern glasses' frames are made from plastic.



© Creative_Outlet/ iStock/ Thinkstock

Give **two** reasons why plastic is better than metal for glasses' frames.

Choose from:

lighter : better conductor : heavier : cheaper

1. _____

2. _____ [2]

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Examiner Only	
Marks	Remark

2 **(a)** Many household substances contain an acid or an alkali.

(i) Complete the following sentences.

Indigestion is caused by too much _____ in the stomach. Milk of Magnesia contains an alkali and can be used to cure indigestion in the stomach in a reaction called _____. [2]

(ii) What is the chemical name for Milk of Magnesia?

Circle the correct answer.

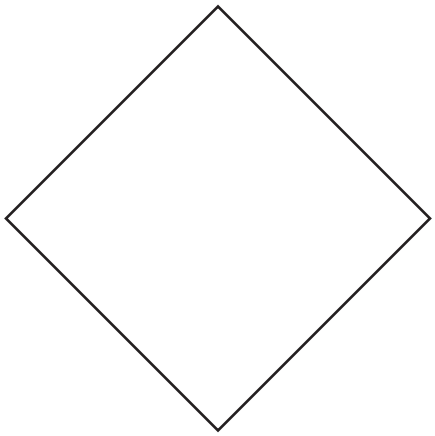
sodium hydrogencarbonate : **magnesium chloride**

magnesium hydroxide

[1]

(b) Sodium hydroxide is a corrosive substance found in oven cleaner.

(i) In the space below draw the hazard symbol you would expect to see on a bottle of oven cleaner.



[1]

(ii) What colour will Universal Indicator turn when added to oven cleaner?

_____ [1]

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(c) The photograph below shows a way of finding the pH of a solution.



© Martyn F. Chillmaid / Science Photo Library

(i) What name is given to this piece of equipment?

_____ [1]

(ii) State **one** reason why this method of measuring pH is better than using Universal Indicator.

_____

_____ [1]

(iii) The equipment above shows a pH reading of 8.77.
What does this tell you about the solution that has been tested?

Tick (✓) the correct answer.

It is a weak acid ☐

It is a weak alkali ☐

It is a strong acid ☐ [1]

Examiner Only	
Marks	Remark

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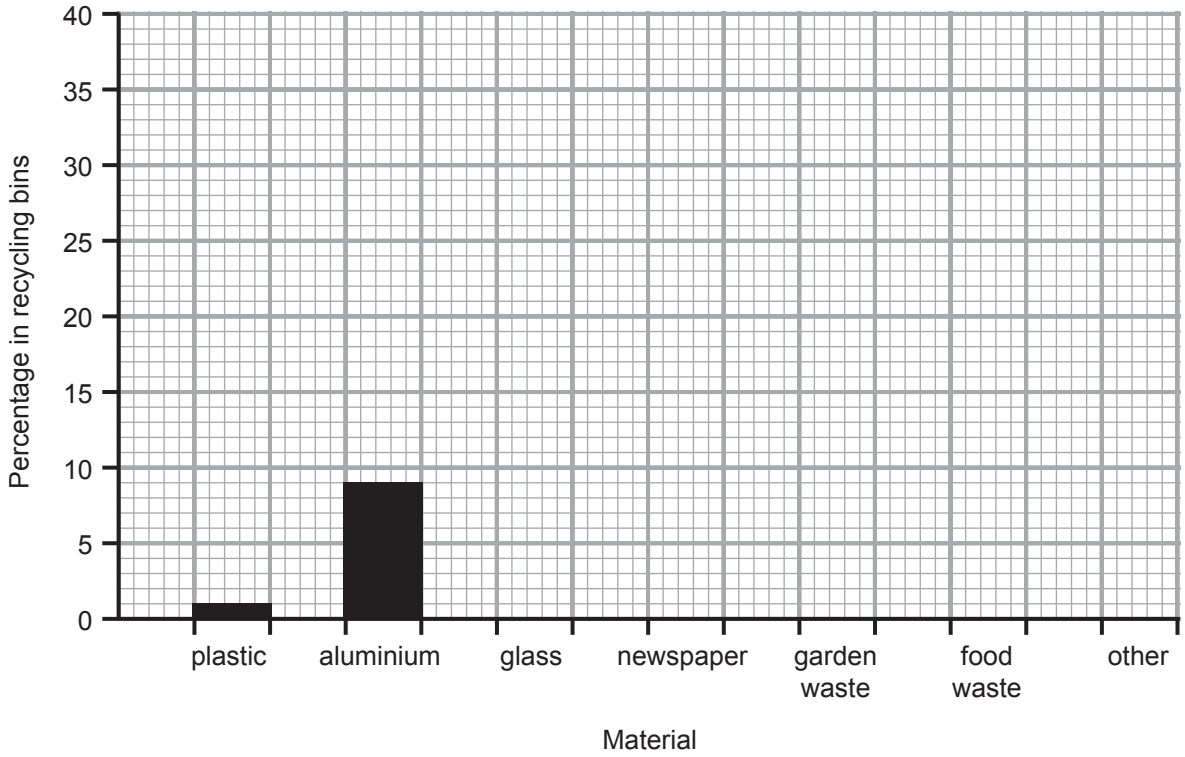
3 The table below shows the percentage of different materials that are in household recycling bins.

Material	Percentage in recycling bins
plastic	1
aluminium	9
glass	11
newspaper	22
garden waste	36
food waste	12
other	9

Examiner Only

Marks	Remark

(a) Use the information in the table to complete the bar chart below.



[2]

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(b) (i) What is meant by the term **non-biodegradable**?

_____

_____ [2]

(ii) Name **two** non-biodegradable materials shown in the table opposite.

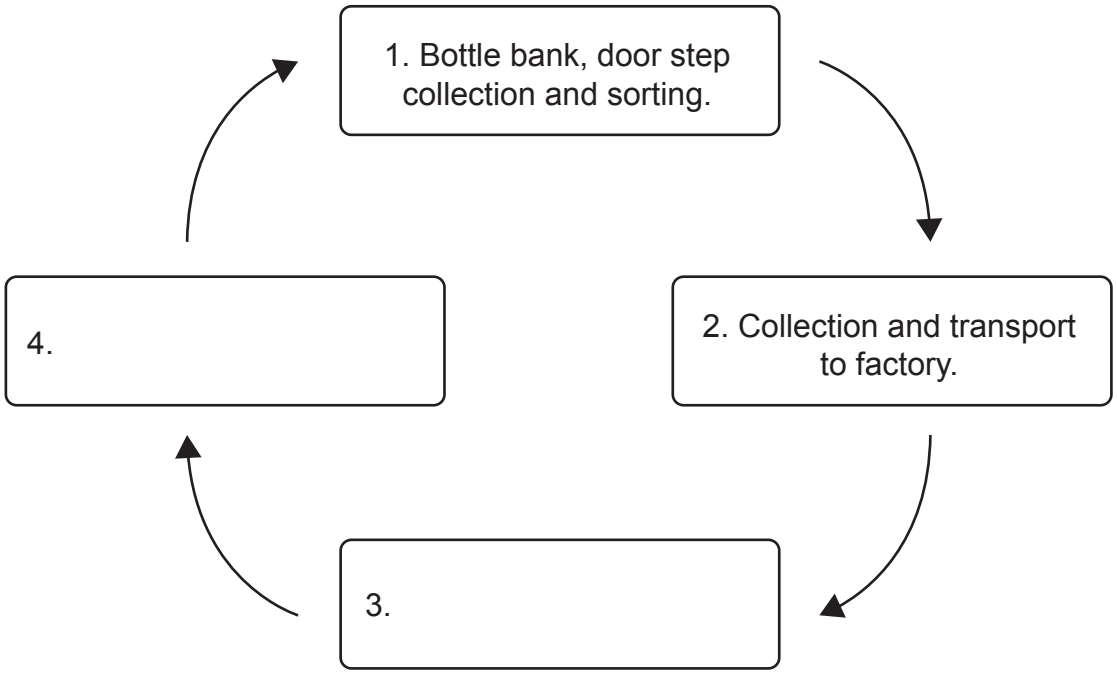
_____ and _____ [2]

(c) State **one** reason why local authorities are encouraging people to recycle.

_____

_____ [1]

(d) Complete the flow diagram below about glass recycling.



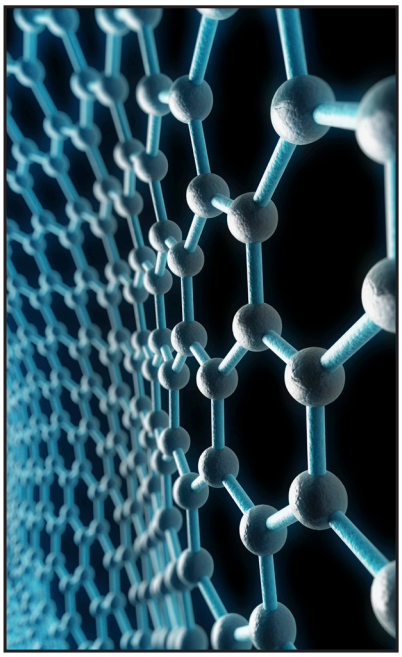
[2]

Examiner Only

Marks	Remark

4 Below is part of an article from a science magazine.

Examiner Only	
Marks	Remark



Graphene – A new wonder material?

Graphene is a nano material. It is a sheet of carbon, only one atom thick, arranged in a honeycomb structure.

Graphene has amazing properties: it is one hundred times stronger than steel, a better conductor than copper and more flexible than rubber. These properties would be useful if graphene was used in the making of a composite material.

A new light bulb made with graphene is due to go on sale soon. Using graphene allows it to conduct electricity and heat better. The light bulb will use less energy and last longer.

© Science Picture Co / Science Photo Library

(a) What size is a nanoparticle?

Circle the correct answer.

10^{-9} m **10^{9} m** **10^{19} m** [1]

(b) Give the names of **two** elements written about in the article above.

_____ and _____ [2]

(c) Give **one** property of graphene that would be useful in making mobile phone covers.

_____ [1]

(d) Give **one** advantage of using graphene in a household light bulb. Explain your answer.

_____

_____

_____ [2]

(e) Another nano material is silver. Give **one** medical use of silver nanoparticles.

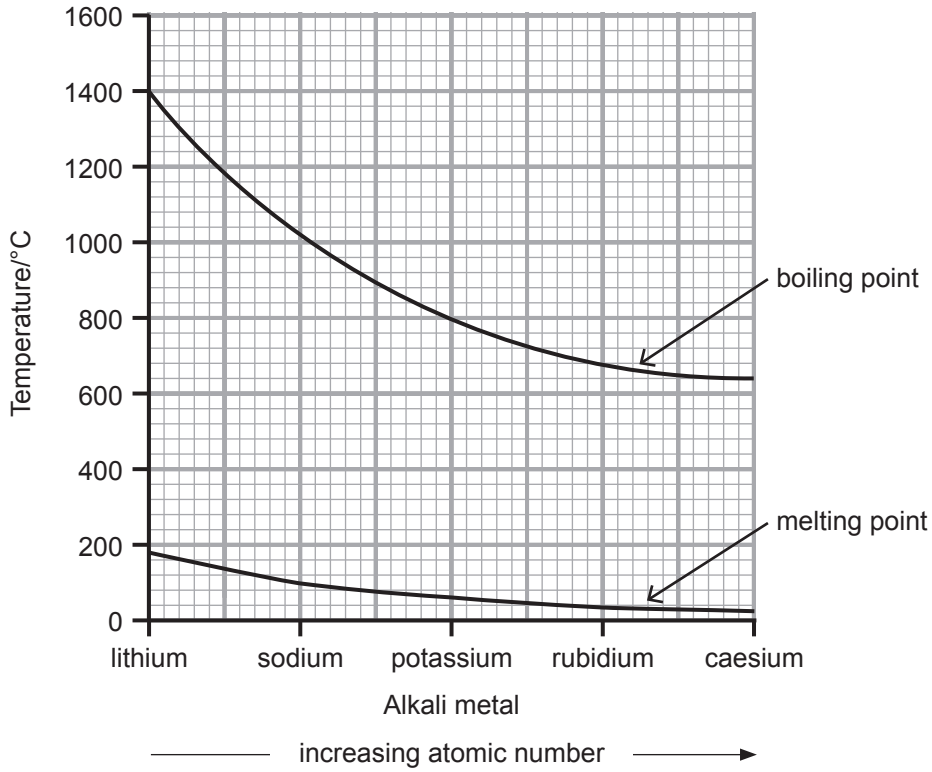
_____ [1]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

5 Information about the melting and boiling points of some Group 1 (alkali) metals is shown below.



Use this information and your knowledge to answer the following questions.

(a) Complete the following sentence to describe the trend in boiling points of the alkali metals.

As the atomic number of the alkali metals _____

_____ [1]

(b) Francium is below caesium in Group 1 of the Periodic Table. Predict the boiling point of francium.

_____ °C [1]

(c) Choose the metal with the biggest difference between its melting point and its boiling point. Calculate the temperature difference between its melting point and its boiling point.

(Show your working out.)

_____ °C [2]

(d) Name the gas formed when the alkali metals react with water.

_____ [1]

(e) Potassium reacts vigorously with water. Describe how you would expect lithium to react with water compared to potassium.

_____

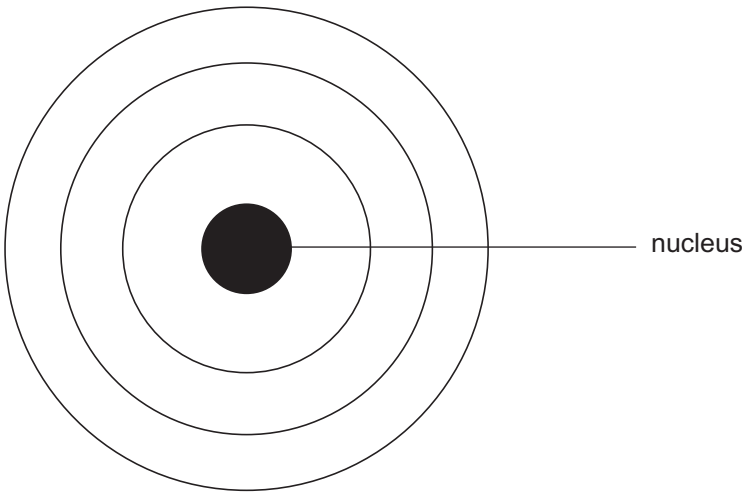
_____ [1]

(f) Apart from wearing safety goggles, state **two** safety precautions needed when adding potassium to water.

1. _____

2. _____ [2]

(g) **(i)** A sodium atom has 11 electrons. Complete the diagram below to show how the electrons are arranged in a sodium atom.



[1]

(ii) In terms of the arrangement of electrons, state why sodium and other alkali metals are placed in Group 1 of the Periodic Table.

_____

_____ [1]

Examiner Only

Marks	Remark

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6 Describe the process of a volcanic eruption.

Your answer should include:

- why volcanoes occur
- the effect on surrounding areas
- the type of rock produced after an eruption.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark

7 The table below gives information about some plastics.

Plastic	Properties	Colours available	Cost
PVC	hard, keeps its shape, weather resistant	wide range of colours	medium
nylon	hard, long lasting	white or cream	high
polythene	soft, flexible, good electrical insulator	wide range of colours but they fade easily	medium
plasticised PVC	soft, flexible, good electrical insulator	wide range of colours	medium
polystyrene	does not keep its shape, good heat insulator	white	low
acrylic	stiff, weather resistant, good electrical insulator	wide range of colours	high

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

Examiner Only	
Marks	Remark

(a) Which **two** plastics could be best used for covering electrical cables?

_____ and _____ [1]

(b) A manufacturer is going to produce cheap, green buckets to sell at large DIY stores.



© AlexandrGryzlov / iStock / Thinkstock

Which plastic should the manufacturer choose? Give **two** reasons for your choice.

_____

_____

_____ [3]

(c) Give **one** reason why polystyrene is **not** used to make garden chairs. Explain your answer.

_____

_____

_____ [2]

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Examiner Only	
Marks	Remark

8 Given below is information about the reactions of some metals with their metal salt solutions.

	Tin sulfate	**Zinc sulfate**	**Copper sulfate**	**Magnesium sulfate**
Tin		no reaction	reaction	no reaction
Zinc	reaction		reaction	no reaction
Copper	no reaction	no reaction		no reaction
Magnesium	reaction	reaction	reaction	

(a) Use the information to put the metals in order of decreasing reactivity.

_____ most reactive

_____

_____

_____ least reactive [2]

(b) (i) Complete the word equation for the reaction between tin and copper sulfate.

copper sulfate	+	tin	→		+	

[2]

(ii) What name is given to this type of reaction?

_____ [1]

(c) Using lines, match each metal reaction with **one** expected observation.

Metal reaction	Expected observation
zinc + copper sulfate	bubbles of gas
	blue solution fades
magnesium + acid	silver coloured solid forms
	solution turns milky

[2]

Examiner Only

Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

General Certificate of Secondary Education
2015–2016

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

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				AVAILABLE MARKS
1	**(a)**	Plastic – shopping bags [1] Copper – bottom of saucepans [1] Wool – clothing [1]	[3]	
	(b)	<table><tr><th>Natural</th><th>Man-made</th></tr><tr><td>wool</td><td>nylon</td></tr><tr><td>silk</td><td></td></tr><tr><td>cotton</td><td></td></tr></table>		
		Each response half mark rounded down	[2]	
	(c)	Lighter [1] cheaper [1]	[2]	7
2	**(a)**	**(i)** Acid [1] Neutralisation [1]	[2]	
		(ii) Magnesium hydroxide	[1]	
	(b)	**(i)** Correct symbol drawn for corrosive	[1]	
		(ii) Dark blue/purple	[1]	
	(c)	**(i)** pH probe/sensor/meter	[1]	
		(ii) More accurate/precise/exact/gives a reading to 2 dp	[1]	
		(iii) Weak alkali	[1]	8
3	**(a)**	All bars correct [2] (only one error [1])	[2]	
	(b)	**(i)** Does not rot away/get broken down [1] by microbes/bacteria/fungi [1]	[2]	
		(ii) Any **two**: plastic aluminium glass	[2]	
	(c)	Reduce landfill/saves raw materials/saves energy/avoid fines	[1]	
	(d)	3. Glass is crushed/made into cullet [1] 4. Furnace and remoulding [1]	[2]	9

				AVAILABLE MARKS
4	**(a)**	10^{-9} m	[1]	
	(b)	Copper [1] carbon [1] (either order)	[2]	
	(c)	Graphene is strong/flexible	[1]	
	(d)	The lightbulb will use less energy/last longer [1] idea of costing less for consumer [1]	[2]	
	(e)	Wound dressings/kill bacteria/sterilising sprays	[1]	7
5	**(a)**	As the atomic number of the alkali metal increases the boiling point decreases	[1]	
	(b)	600–640 °C (any value in the range)	[1]	
	(c)	1400 – 180 [1] 1220 [1]	[2]	
	(d)	Hydrogen	[1]	
	(e)	Lithium will react less vigorously	[1]	
	(f)	Any **two** from: use a safety screen/fume cupboard use tongs use a small amount of potassium/large amount of water	[2]	
	(g) **(i)**	2.8.1 drawn correctly	[1]	
	(ii)	They all have the same number of electrons/1 electron in their outer shell	[1]	10

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	AVAILABLE MARKS

6 Indicative Content:

- idea of plate tectonics
- volcanoes occur when tectonic plates are pulled apart/pushed together
- pressure builds up (in the magma chamber)
- magma is pushed to the surface
- lava flows out of cracks/down sides of volcano
- produces dust/gas/ash clouds
- lava cools to form igneous rocks
- kills plants and animals in the surrounding areas

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the process of a volcanic eruption using **six to eight** of the points above, in a logical sequence including the term plate tectonics. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe the process of a volcanic eruption using **four or five** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe the process of a volcanic eruption using **one, two or three** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Not worthy of credit.	[0]

6

7 (a) Plasticised PVC and polythene [1]

(b) PVC [1]
can be coloured [1]
hard/keeps its shape/weather resistant/qualified cost [1] [3]

(c) Does not keep its shape [1]
would not support the weight of a person [1] [2]

6

8 (a) Magnesium, zinc, tin, copper (any 2 in correct order [1]) [2]

(b) (i) Tin sulfate [1] + copper [1] (either order) [2]

(ii) Displacement [1]

(c) Zinc + copper sulfate – blue solution fades [1]
magnesium + acid – bubbles of gas [1] [2]

7

Total **60**

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Rewarding Learning

General Certificate of Secondary Education
2014–2015

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

THURSDAY 14 MAY 2015, MORNING

MARK SCHEME

STEMUP.CO.UK

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

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				AVAILABLE MARKS
1	**(a)**	**(i)** Propanol	[1]	
		(ii) Sulfuric acid	[1]	
		(iii) Toxic	[1]	
	(b)	Correct symbol for explosive	[1]	4
2	**(a)**	Colour [1] beetroot [1] neutralisation [1]	[3]	
	(b)	Acid [1] 12–14 (any value in range) [1] 8–11 (any value in range) [1]	[3]	6
3	**(a)**	Granite, slate, sandstone, limestone (reverse order [1])	[2]	
	(b)		[3]	5

Type of rock	Example
igneous [1]	granite
metamorphic	**marble/slate** [1]
sedimentary [1]	limestone

4	**(a)**	Both labels correct	[1]	
	(b)	**(i)** 6000 (96 800 – total calculated [1])	[2]	
		(ii) 3200	[1]	
	(c)	Landfill sites are becoming full/qualified pollution (air, ground)	[1]	5
5	**(a)**	A material that changes its **properties** [1] (or two properties described) as a result of its surroundings [1] (or described with two conditions)	[2]	
	(b)	10^{-9} m	[1]	
	(c)	Wound dressings/kill bacteria/sterilising sprays	[1]	
	(d)	**Possible** side effects/toxic/harmful to humans/scientists feel more research is needed/allergic	[1]	5

				AVAILABLE MARKS
6	**(a)**	Same amount of metal/same temperature of water	[1]	
	(b)	There would be no more bubbles/metal disappeared	[1]	
	(c)	As you go down Group One the reaction is faster	[1]	
	(d)	Small amount of metal/safety screen/handle metal using tongs/ large amount of water/glass cover/fume cupboard (do not allow: glove; board; reference to cloths; stand well back)	[1]	4
7	**(a)**	Strong [1] cheap [1] penalise: m.p./density	[2]	
	(b)	Gold is very dense/heavy[1] wires may break/too heavy for pylons [1] independent marks	[2]	
	(c)	Aluminium [1] low density [1] penalise reference to other reasons (ignore cost)	[2]	6
8	**(a)**	X placed in correct position (Group 7)	[1]	
	(b) **(i)**	D/argon	[1]	
	(ii)	A	[1]	
	(c)	18	[1]	
	(d)	Octaves [1] Mendeleev [1]	[2]	6
9	**(a)** **(i)**	Copper [1] water [1] (either order)	[2]	
	(ii)	Reduction (accept REDOX)	[1]	
	(b)	Y [1] the diagram shows two of the **same** type of atom joined together [1]	[2]	
	(c)	6	[1]	6

10 **(a)** Bone **combines** two or more materials [1]
reference to properties/reference to hard & flexible [1]
more useful/better material/for a particular property/purpose [1] [3]

(b) **(i)**

Element	Number of protons	Number of neutrons
Phosphorus	**15** [1]	16
Oxygen	8	**8** [1]

[2]

(ii) zero/ $\frac{1}{1840}$ [1] or range $\frac{1}{1800} \rightarrow \frac{1}{2000}$

–1 [1] [2]

AVAILABLE MARKS

7

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11 Indicative Content:

AVAILABLE MARKS

Method

- use a **flame test** rod/nichrome wire
- dip into (concentrated) acid
- dip into the metal salt
- place into **blue** Bunsen flame
- clean the rod/use new rod

or

- use a spray bottle
- make a solution of the salt/add water
- spray into flame
- use blue Bunsen flame
- clean bottle/use a new bottle

Results

- copper – blue-green
- lithium – red [6]

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe carrying out a flame test using **five to seven** of the points above, in a logical sequence including at least one result. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe carrying out a flame test using **three or four** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe carrying out a flame test using **one or two** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Not worthy of credit.	[0]

6

Total **60**

Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2014–2015

Science: Single Award

Unit 2 (Chemistry)
Foundation Tier

GSS21

[GSS21]

WEDNESDAY 25 FEBRUARY 2015, MORNING

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 eleven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **11**.
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 included for your use.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
Total Marks	

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Examiner Only	
Marks	Remark

1 Saucepan handles are often made from plastic.



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(a) Give **two** properties which make plastic a suitable material for making saucepan handles.

Choose from:

strong : flexible : soft

shiny : easily moulded

1. _____

2. _____ [2]

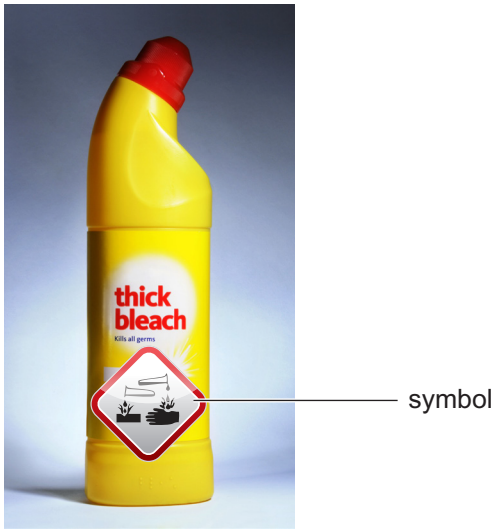
(b) Explain fully why plastic saucepan handles are safer than metal handles.

_____

_____ [2]

Examiner Only	
Marks	Remark

2 Some substances are dangerous and have **symbols** on their containers.



© Cordelia Molloy / Science Photo Library

(a) What name is given to these symbols?

Circle the correct answer.

security **universal** **safety** **hazard**

[1]

(b) Give **one** reason why symbols are better than words.

_____

_____ [1]

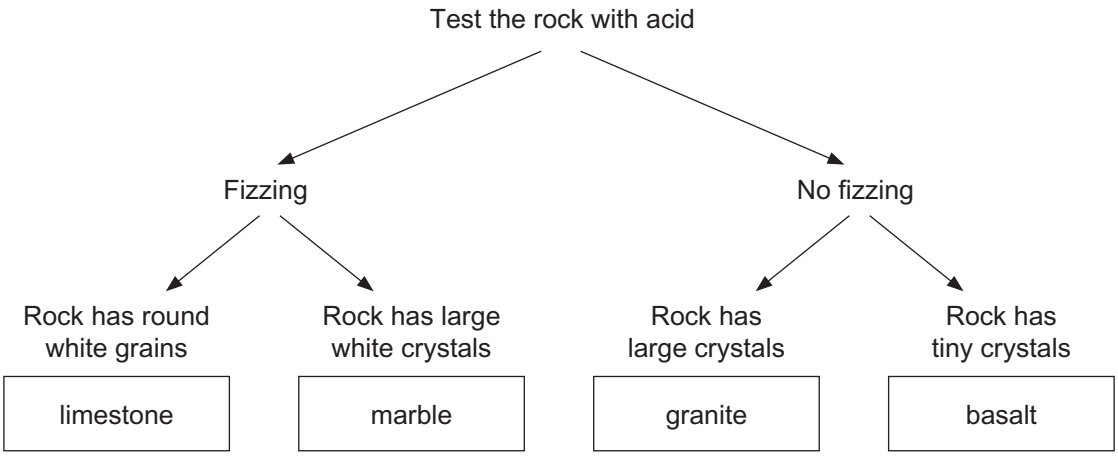
(c) In the box below draw the symbol you would expect to see on a bottle of **toxic** weed killer.

[1]

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Examiner Only	
Marks	Remark

3 **(a)** The Earth's crust is made up of many different kinds of solid rock. Four of these are named below including some information on how to identify them.



Using **only** the information above, answer the following questions.

(i) Describe the appearance of limestone.

_____

_____ [1]

(ii) Give **one** difference between basalt and granite.

_____

_____ [1]

(b) **(i)** Which **type** of rock is basalt?

_____ [1]

(ii) Marble is an example of a metamorphic rock. Name **one** other metamorphic rock.

_____ [1]

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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

4 Nanomaterials can be used in tennis balls and golf balls. This makes tennis balls bounce higher and golf balls fly straighter. Nanotechnology is also used in the making of trousers and socks so they will last longer and are cooler in summer.

Scientists think that nanotechnology has the potential to change the way we live if used in medicine and construction materials. However they suggest that much more work and time is needed to establish the dangers of nanoparticles before they are widely used in everyday life.

(a) What is the value of one **nanometre**?
Tick (✓) the correct answer in the table below.

Value	Tick
1000 m	
1 m	
0.001 m	
0.000000001 m	

[1]

(b) **(i)** From the information provided, give the advantage of using nanomaterials in golf balls.

_____ [1]

(ii) Give **one** use of nanomaterials in medicine.

_____ [1]

(iii) Why are scientists concerned about the use of nanomaterials?

_____

_____ [1]

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(c) Shown below is a baby's bottle made from plastic.



© DimaP / iStock / Thinkstock

The plastic changes colour from blue to red when hot liquids are added.

What type of smart material is this plastic?

Circle the correct answer.

thermochromic **photochromic** **electrochromic**

[1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

5 **(a)** The diagram below shows a fingerprint taken by the police from a crime scene.



© Science Source / Science Photo Library

(i) Name the type of fingerprint pattern shown above.

_____ [1]

(ii) The police have three suspects whose fingerprints are shown below.



A **B** **C**

© Science Source / Science Photo Library

Which suspect (**A**, **B** or **C**) was at the crime scene?

Suspect _____ [1]

(b) Explain fully how a fingerprint can be taken from a white surface.

_____

_____

_____

_____

_____ [3]

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(c) Flame tests can also be used to solve crime.
Complete the table below about results of a flame test.

Metal ion	Flame colour
potassium	lilac
	blue-green
sodium	

[2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 In May 2010, an earthquake near the city of Santiago in Chile destroyed most of the buildings and killed hundreds of people. The earthquake did not come as a surprise to scientists who had predicted it a week earlier.



© Ria Novosti / Science Photo Library

The table below shows how the Richter scale is used to compare the size of earthquakes.

Richter scale value	Effect of earthquake
Less than 2	People do not feel the earthquake
2–3.9	People feel the earthquake but it rarely causes damage to buildings
4–4.9	People feel the earthquake and it causes minor damage to buildings
5–5.9	Shaking of the ground and major damage to some buildings
6–7.9	Violent shaking of the ground and many buildings destroyed
8–10	Very violent shaking of the ground and most buildings destroyed

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Use the information provided and your knowledge to answer the following questions.

Examiner Only	
Marks	Remark

(a) Suggest a Richter scale value for the earthquake that happened near Santiago in Chile.

_____ [1]

(b) Suggest **one** reason why governments and people often ignore scientists' predictions of an earthquake.

_____

_____ [1]

(c) Earthquakes less than 2 on the Richter scale are a common occurrence in the UK. Suggest why people in the UK are unconcerned by these earthquakes.

_____

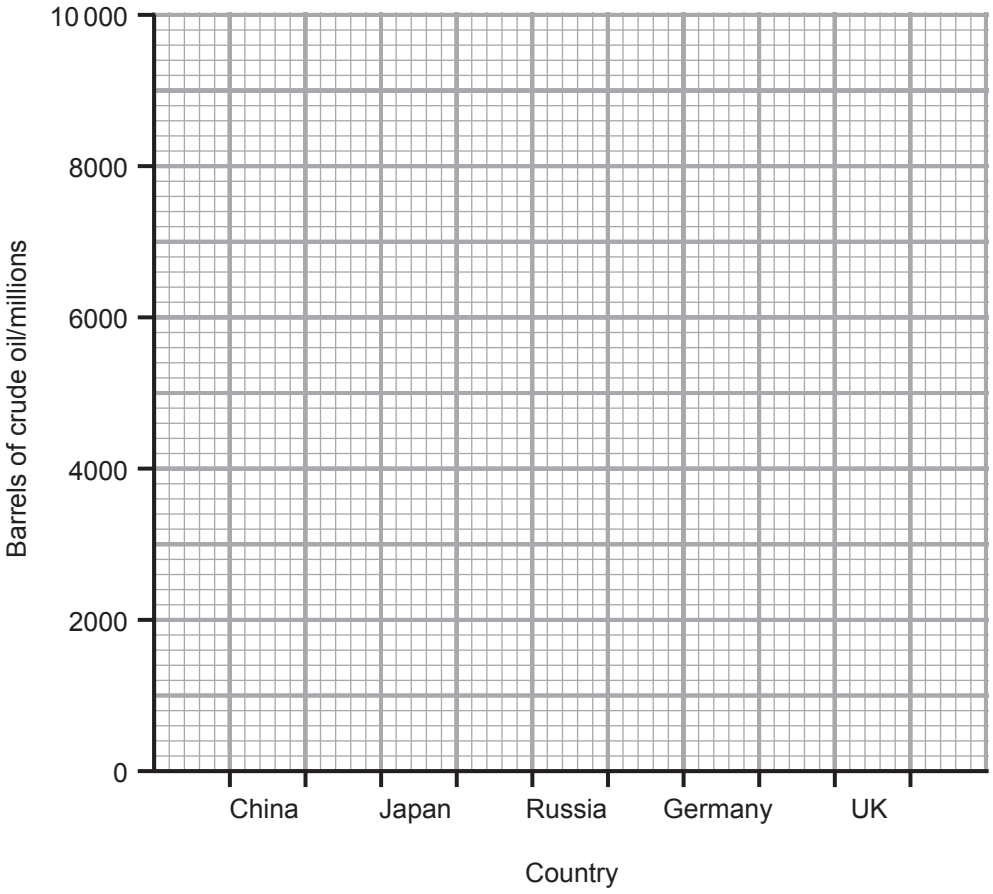
_____ [1]

Examiner Only	
Marks	Remark

7 The table below gives information about the population of five countries and how much crude oil they use per day.

Country	Barrels of crude oil/ millions	Population/ millions
China	9800	1350
Japan	4400	180
Russia	3200	165
Germany	2400	82
UK	1600	61

(a) Draw a **bar chart** on the grid below to show how many barrels of crude oil are used by each country.



[2]

(b) France has a population of 70 million people. Predict how many barrels of crude oil France would use per day.

_____ million [1]

(c) Petrol can be obtained from crude oil by an industrial process. Name this process.

_____ [2]

Examiner Only	
Marks	Remark

8 **(a)** Stomach ache can be caused by too much hydrochloric acid in the stomach. Indigestion tablets can be used to reduce the amount of acid in the stomach as they contain calcium carbonate.



© GIPhotoStock / Science Photo Library

(i) Complete the word equation for this reaction.

calcium carbonate	+	hydrochloric acid	→		+		+	carbon dioxide

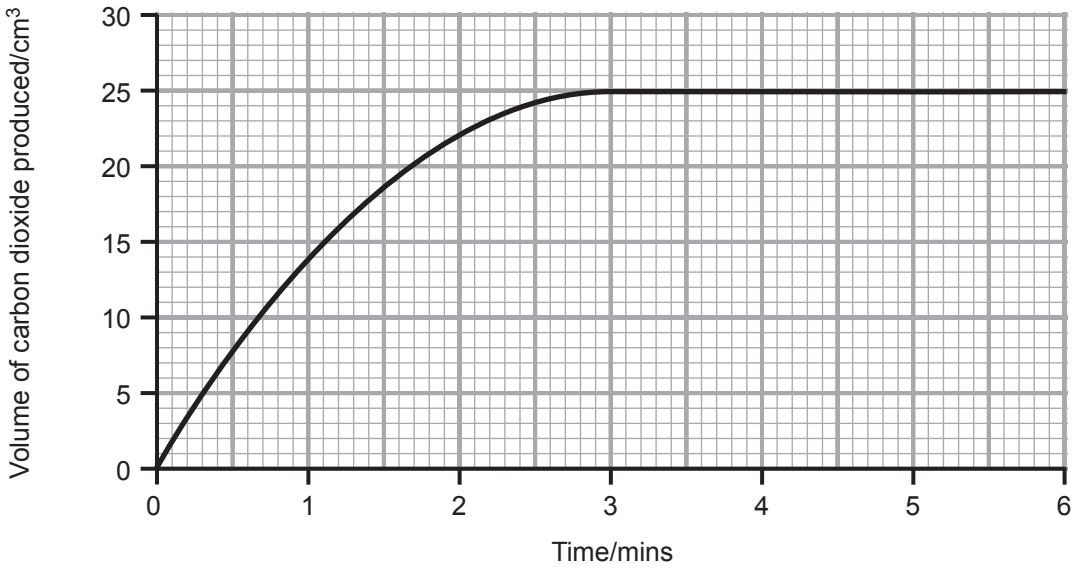
[2]

(ii) What name is given to this type of reaction?

_____ [1]

Examiner Only	
Marks	Remark

Some hydrochloric acid is added to excess calcium carbonate.
The graph below shows how the volume of carbon dioxide produced changes with time.



(b) Describe fully the trend shown by these results.

_____

_____

_____ [2]

(c) Describe the test for carbon dioxide.

_____

_____

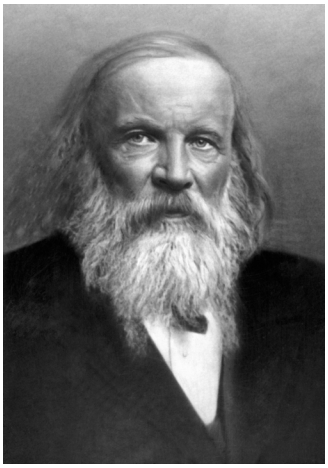
_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

9 In 1869 the scientist pictured below put the sixty known elements into a Periodic Table.



© Ria Novosti / Science Photo Library

(a) Name the scientist pictured above.

_____ [1]

(b) Name the unreactive **group** of elements not included in his table because they had not been discovered by 1869.

_____ [1]

(c) Sodium is in Group 1 of the modern Periodic Table.

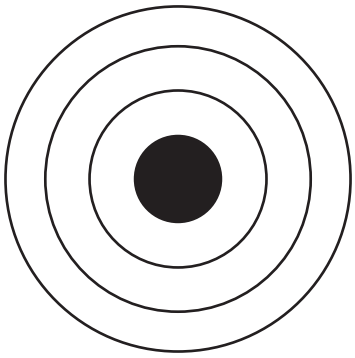
(i) Complete the table below to show the number of each different particle in a sodium atom.

You may find your Data Leaflet helpful.

	Number of protons	**Number of neutrons**	**Number of electrons**
sodium (Na)			

[3]

(ii) Complete the diagram below to show the electronic structure of a sodium atom.



sodium atom

[1]

(d) When sodium is added to water there is a violent reaction during which it moves on the water surface.

(i) Give **two** other observations during this reaction.

1. _____

2. _____ [2]

(ii) Name the alkaline solution formed during this reaction.

_____ [1]

(e) Potassium and sodium are both in Group 1 of the Periodic Table. Give **two** reasons why these metals are in the same Group.

1. _____

2. _____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

10 (a) Some students investigated the hardness of water in four towns (**W**, **X**, **Y** and **Z**). The following method was used for each town.

1. Measure 25 cm^3 of water and add to a conical flask.
2. Add 1 cm^3 of soap solution and shake well.
3. Repeat step 2 until a permanent lather forms.
4. Record the volume of soap solution used.
5. Boil another 25 cm^3 of water and repeat steps 1 to 4.

The results are shown below.

	Volume of soap solution/cm^3	
Town	**before boiling**	**after boiling**
W	26	1
X	6	6
Y	24	17
Z	1	1

(i) Name a piece of apparatus the students could have used to measure 1 cm^3 of soap solution.

_____ [1]

(ii) Suggest **one** way in which the reliability of the results could have been improved.

_____ [1]

(b) What can you conclude about the hardness of the water from Town **Y**? Explain your answer.

_____

_____

_____

_____ [2]

(c) Apart from using more soap, give **one** disadvantage of using hard water.

_____ [1]

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11 A student adds a piece of magnesium metal to a solution of copper sulfate. Describe the reaction between magnesium and copper sulfate solution.

Your answer should include:

- the name of this type of reaction
- an explanation of why this reaction happened
- three observations that could be made during this reaction

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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113159

Rewarding Learning

General Certificate of Secondary Education
2014–2015

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

WEDNESDAY 25 FEBRUARY 2015, MORNING

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STEMUP.CO.UK

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				AVAILABLE MARKS
1	(a)	Strong [1] easily moulded [1]	[2]	
	(b)	Plastics are poor conductors of heat/metals are good conductors of heat [1] reference to not being burned/being burned [1]	[2]	4
2	(a)	Hazard	[1]	
	(b)	Greater visual impact/recognised easily/recognised by anyone regardless of language or reading ability	[1]	
	(c)		[1]	3
3	(a) (i)	Round, white grains	[1]	
	(ii)	Size of crystals	[1]	
	(b) (i)	Igneous	[1]	
	(ii)	Slate (or other named metamorphic rock)	[1]	4
4	(a)	0.000000001 m	[1]	
	(b) (i)	Fly straighter	[1]	
	(ii)	Sterilise equipment/bacterial sprays/dressing wounds	[1]	
	(iii)	Possible unknown side effects/not enough research has been done	[1]	
	(c)	Thermochromic	[1]	5

					AVAILABLE MARKS
5	**(a)**	**(i)**	Whorl	[1]	
		(ii)	Suspect B	[1]	
	(b)		Sprinkle carbon black onto surface [1] brush off excess dust [1] lift print with (clear) tape/transfer print onto card [1]	[3]	
	(c)		Copper [1] yellow/orange (either on its own) [1]	[2]	7
6	**(a)**		Any value in the range 8 – 10	[1]	
	(b)		Difficult to accurately predict an earthquake	[1]	
	(c)		People do not feel the earthquake (penalise reference to damaging buildings)	[1]	3
7	**(a)**		5 bars correct [2] or 4 bars correct [1]	[2]	
	(b)		1800–2200 million	[1]	
	(c)		Fractional [1] distillation [1]	[2]	5
8	**(a)**	**(i)**	Calcium chloride ($CaCl_2$) [1] water (H_2O) [1] (any order)	[2]	
		(ii)	Neutralisation	[1]	
	(b)		The volume of CO_2 increases with time [1] after 3 mins no more CO_2 produced/stops increasing after 25 cm^3 [1]	[2]	
	(c)		Limewater [1] turns cloudy/milky [1]	[2]	7

9 **(a)** Mendeleev [1]

(b) Noble gases [1]

(c) **(i)**

	Number of protons	Number of neutrons	Number of electrons
Sodium (Na)	11 [1]	12 [1]	11 [1]

[3]

(ii) Correct electronic structure drawn; 2.8.1
Consequential (c)(i) (12 or 23 only) [1]

(d) **(i)** Any **two** from:
- yellow or orange flame/sparks
- bubbles/fizzing/hissing/gas given off
- exothermic/(melts) to form a ball
- dissolves/disappears [2]

(ii) Sodium hydroxide [1]

(e) Any **two** from:
- both alkali metals
- both have one electron in outside shells
- both have similar (chemical) reactions/properties [2]

11

10 **(a)** **(i)** Burette/measuring cylinder/syringe/pipette [1]

(ii) Repeat the experiment [1]

(b) Y is a mixture of permanent and temporary hard water [1]
It needed a lot of soap solution both before and after boiling [1] [2]

(c) Causes 'fur' on kettles/limescale in pipes/leaves stains on clothing/block in pipes/cost qualified (e.g. replace kettles/more energy)
Not soap related [1]

5

AVAILABLE MARKS

11 Indicative Content:

- A displacement reaction has occurred
- Displacement is when a more reactive metal takes the place of a less reactive metal in a compound/full equation
- Magnesium is more reactive than copper/magnesium is higher in the reactivity series
- Copper sulfate is blue
- Solution fades/goes colourless
- Pink/red/brown solid is produced
- Silver/grey solid disappears
- Exothermic

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the displacement reaction using **five or more** of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe the displacement reaction using **three to four** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe the displacement reaction using **one or two** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Not worthy of credit.	[0]

[6] 6

Total **60**

AVAILABLE MARKS

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2014–2015

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

GSS21

THURSDAY 13 NOVEMBER 2014, MORNING

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 ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **10**.
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 included in this question paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** Given below is information about some household substances. Complete the table.

Choose from:

vinegar : baking soda : lemon juice

Substance	Chemical present
Milk of Magnesia	Magnesium hydroxide
	Sodium hydrogencarbonate
	Citric acid

[2]

(b) Hazard symbols are used to warn of danger. The hazard symbol below is found on a bottle of hydrochloric acid.



© Danylo Fomin/iStock/Thinkstock

(i) Name this hazard symbol.

_____ [1]

(ii) Circle the correct pH for hydrochloric acid.

2 **7** **12**

[1]

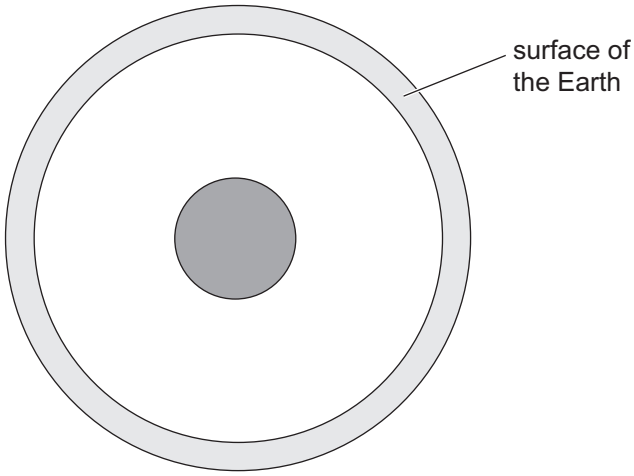
(c) Name a plant that can be used to make a chemical indicator.

_____ [1]

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Examiner Only	
Marks	Remark

2 The diagram below shows the structure of the Earth.



(a) Complete the following sentences.

Choose from:

core **layer** **mantle** **crust** **nucleus**

The surface of the Earth is called the _____.

It is made up of tectonic plates that float on the _____.

At the centre of the Earth is the _____. [3]

(b) Complete the table below about different rock types.

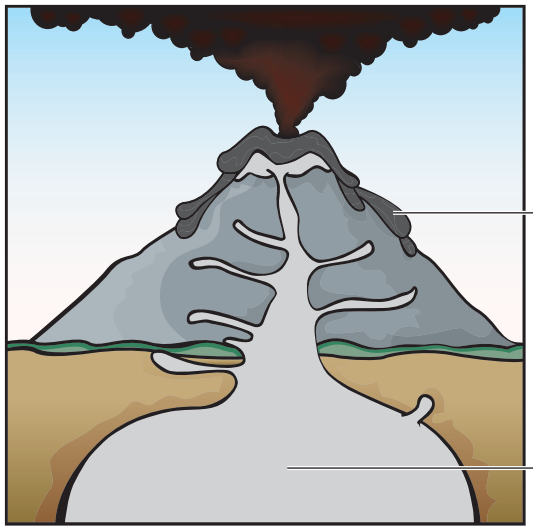
Rock type	Example
metamorphic	marble
sedimentary	
	granite

[2]

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(c) The diagram below shows a cross-section through an active volcano.

Label the parts of the volcano shown below.



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[2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

3 **(a)** The table below shows the pH that some plants grow best in.

Plant	pH
apple	5.0–6.5
potato	4.5–6.0
blackcurrant	5.5–8.0
mint	7.0–8.0
onion	6.0–7.0
strawberry	5.0–7.0
lettuce	6.0–7.0

Use the information in the table and your knowledge to answer the following questions.

(i) Name the plant that will grow best in the most acidic soil.

_____ [1]

(ii) Name the plant which grows best over the largest **range** of pH values.

_____ [1]

(iii) The pH of a farmer's field is 6.5. How many plants named in the table would grow well at this pH?

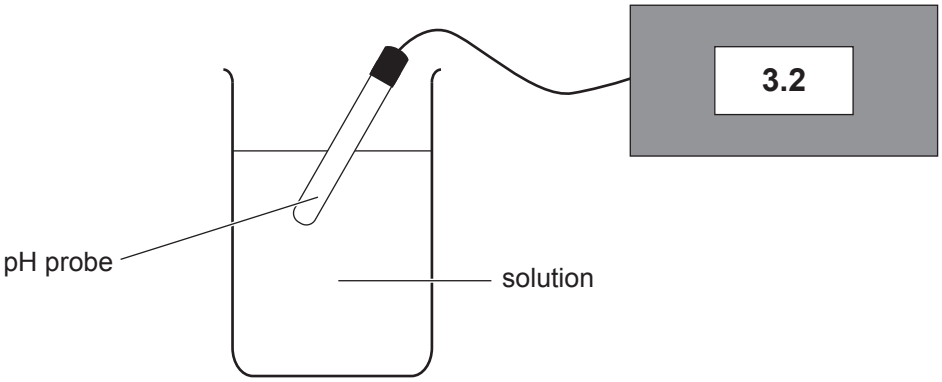
_____ [1]

(b) Name a substance farmers can use to neutralise acidic soil.

_____ [1]

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The diagram below shows a way of measuring pH.



(c) Give **one** advantage of using a pH probe instead of an indicator solution to measure pH.

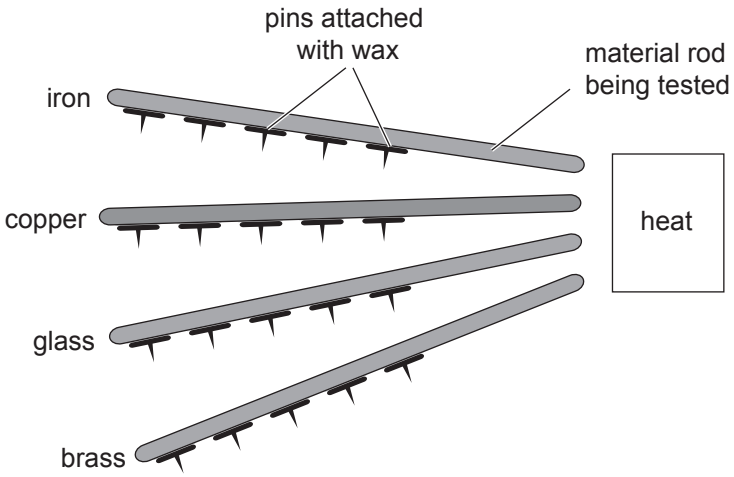
_____ [1]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

4 **(a)** A student investigated how four materials (iron, copper, glass and brass) allow heat to pass through them. He used the apparatus shown in the diagram below.



The number of pins still attached to each rod was recorded after 1, 3 and 5 minutes. The results are shown below.

Material	Number of pins attached after;		
	1 minute	3 minutes	5 minutes
Iron	5	5	4
Copper	4	3	2
Glass	5	5	5
Brass	5	4	3

(i) On the diagram above, put a circle around the pin that will fall off first. [1]

(ii) List the four materials in order of conductivity.

_____ Best conductor

_____ ↓

_____

_____ Worst conductor [2]

(b) State **two** ways in which the student made this investigation a fair test.

1. _____

2. _____ [2]

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5 Criminals can be identified by matching their fingerprint patterns with those taken from a crime scene.



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(a) Arch, loop and whorl are three of the main fingerprint patterns. Name **one** other main fingerprint pattern.

_____ [1]

(b) Police dust powder over prints to make them visible. Name a powder used to show prints on a white surface.

_____ [1]

(c) A national database could hold everyone's fingerprint records.

Suggest why a national database of fingerprints is useful and why some people may object to it.

_____

_____

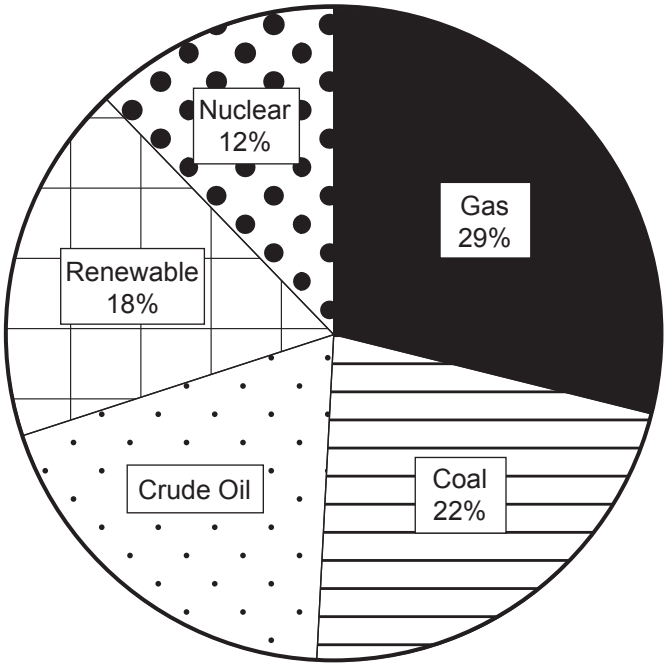
_____ [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

6 Below is a pie chart showing sources of energy used in the UK during 2013.



(a) Calculate the percentage of the UK's energy that came from crude oil in 2013.

(Show your working out.)

_____ % [2]

(b) Complete the paragraph below.

Crude oil is a mixture that can be separated by fractional distillation.

This involves heating the mixture to evaporate the different fractions.

This works because each fraction has a different _____

_____. [1]

Examiner Only	
Marks	Remark

7 The Government has set local councils targets for recycling. The aim is to reduce the amount of waste that ends up in landfill sites.



© Digital Vision/Thinkstock

(a) Some waste is non-biodegradable. Explain fully what is meant by the term 'non-biodegradable'.

_____

_____ [2]

(b) Waste plastic can be disposed of in several ways.

- **Burning** – waste plastic is burned to provide energy, but this can produce toxic gases such as carbon monoxide.
- **Landfill** – waste plastic can be put into landfill sites and left underground for many years. This can cause pollution of groundwater.
- **Recycling** – waste plastics can be recycled by melting and remoulding them into new items.

Using only the information above, name the method which is the most environmentally friendly way to dispose of waste plastic. Explain fully your answer.

Method _____ [1]

Explanation _____

_____

_____

_____ [2]

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8 Below is an outline of the modern Periodic Table.

																	He
Li																	
	Mg															Cl	Ar
										Cu							
										Ag							

(a) Using only the elements shown above and your knowledge, answer the following questions.

(i) Give the symbol of an element that is in **Group 2**.

_____ [1]

(ii) Name **two** elements that are in the same **period**.

_____ and _____ [1]

(iii) Name the element that has **only one** electron in its outer shell.

_____ [1]

(iv) Give the name of a gas shown on the Periodic Table above.

_____ [1]

(b) What name is given to elements in Group 7?

_____ [1]

(c) On the outline Periodic Table above, write the symbol for hydrogen in its correct position. [1]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

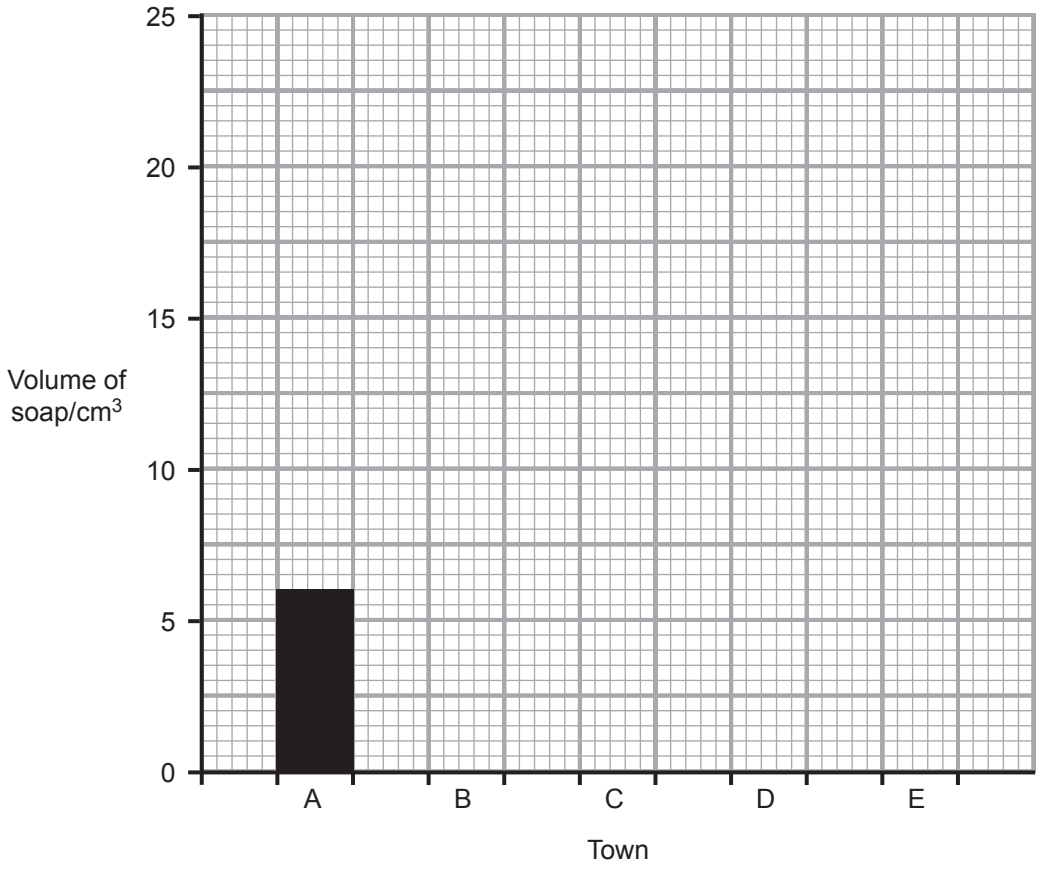
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Examiner Only	
Marks	Remark

9 **(a)** A scientist collected water samples from five towns (**A**, **B**, **C**, **D** and **E**). The table below gives the volume of soap solution needed to produce a lather with each of the samples.

Town	Volume of water/ cm^3	Volume of soap/ cm^3
A	50	6
B	50	17
C	50	24
D	50	20
E	50	11

(i) Use the information in the table to complete the bar chart below.



[2]

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Examiner Only	
Marks	Remark

(ii) Which town (**A**, **B**, **C**, **D** or **E**) has the hardest water?
Explain your answer.

Town _____

Explanation _____

_____ [2]

(iii) Scientists found that they needed 11 cm^3 of soap to produce a lather after shaking the water sample from **town E**.
Describe how they could continue their investigation to prove that the water is temporary hard water, including how the results should show this.

_____

_____

_____

_____

_____ [3]

(b) **(i)** Name **two** metal ions that cause hard water.

_____ and _____ [2]

(ii) Apart from taste, give **one** advantage of drinking hard water.

_____ [1]

(c) Hard water can cause undesirable deposits (fur) in kettles.

(i) Complete the word equation to show how these undesirable deposits form in kettles.

calcium hydrogencarbonate	→		+		+	

[3]

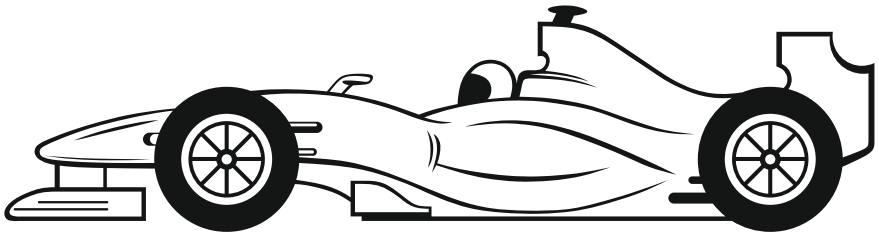
Examiner Only	
Marks	Remark

(ii) Give **one** reason why these deposits cause problems in kettles.

_____ [1]

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10 The first racing cars were built using aluminium. Around 1990 this was replaced with glass fibre, a composite material.



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Explain why the makers of modern Formula One cars choose glass fibre instead of aluminium to make the car bodies.

Your answer should include:

- a full explanation of what a composite material is
- the advantages of using glass fibre in Formula One car bodies
- a disadvantage of glass fibre.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only

Marks	Remark

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113159

Rewarding Learning

General Certificate of Secondary Education
2014–2015

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

THURSDAY 13 NOVEMBER 2014, MORNING

MARK SCHEME

STEMUP.CO.UK

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

				AVAILABLE MARKS
1	**(a)**	Baking soda [1] lemon juice [1]	[2]	
	(b)	**(i)** Corrosive	[1]	
		(ii) 2	[1]	
	(c)	Blackcurrant/beetroot/red cabbage or other suitable	[1]	5
2	**(a)**	Crust [1] mantle [1] core [1]	[3]	
	(b)	limestone/sandstone [1] igneous [1]	[2]	
	(c)	Lava [1] magma/magma chamber [1]	[2]	7
3	**(a)**	**(i)** Potato	[1]	
		(ii) Blackcurrant	[1]	
		(iii) five	[1]	
	(b)	lime/calcium oxide	[1]	
	(c)	More accurate/precise	[1]	5
4	**(a)**	**(i)** Circle around first pin (closest to heat) on copper rod	[1]	
		(ii) copper, brass, iron, glass (two materials in correct order [1])	[2]	
	(b)	Any **two** from: same thickness of rod same distance between pins same amount of wax/same type of wax rods same distance from heat source/same amount of heat/heat for same amount of time same number of pins/same type of pins	[2]	5
5	**(a)**	Composite	[1]	
	(b)	Carbon/Carbon black	[1]	
	(c)	Crimes could be solved quicker/easier/more crimes could be solved/ can be internationally shared [1] may fall into the hands of criminals/Invasion of privacy [1]	[2]	4

					AVAILABLE MARKS
6	**(a)**	29 + 22 + 18 + 12 = 81 [1] 19% [1]		[2]	
	(b)	Boiling point/temperature		[1]	3
7	**(a)**	Cannot be broken down/rot/decompose/decay [1] by microbes [1]		[2]	
	(b)	Recycling		[1]	
		Explanation, any **two** from: • causes less air pollution/no toxic gases produced [1] • no use of land-fill sites/no litter produced [1] • less water pollution [1] • saves (natural) resources [1]		[2]	5
8	**(a)**	**(i)** Mg/magnesium		[1]	
		(ii) Any **two**: Magnesium/chlorine/argon (accept symbols)		[1]	
		(iii) Lithium/Li		[1]	
		(iv) Chlorine/helium/argon (accept symbols)		[1]	
	(b)	The Halogens		[1]	
	(c)	H added in correct position		[1]	6
9	**(a)**	**(i)** All four bars drawn correctly (three bars drawn correctly award [1])		[2]	
		(ii) C [1] It took the most soap to produce a lather [1]		[2]	
		(iii) Measure out 50 cm^3 of water/measure same volume [1] boil the sample [1] less soap is needed after boiling [1]		[3]	
	(b)	**(i)** Calcium [1] and magnesium [1] (either order)		[2]	
		(ii) Good for teeth or bones/prevents heart disease		[1]	
	(c)	**(i)** Calcium carbonate [1] water [1] carbon dioxide [1] (**any order**)		[3]	
		(ii) It stops kettles working properly/wastes energy		[1]	14

10 Indicative Content:

- A composite material is one that combines the properties of more than one material
- to produce a more useful/new material for a particular purpose
- **Three** from glass fibre is light/glass fibre is easily moulded/car can go faster/ car will use less fuel or other suitable
- Composites are expensive [6]

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe composite materials using **five or more** of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe composite materials using **three or four** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe composite materials using **one or two** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Not worthy of credit.	[0]

Total

AVAILABLE MARKS
6
60

STEMUP.CO.UK

Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2013–2014

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

GSS21

THURSDAY 15 MAY 2014, MORNING

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 eleven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **10(a)**.
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 included in this question paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
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11	
Total Marks	

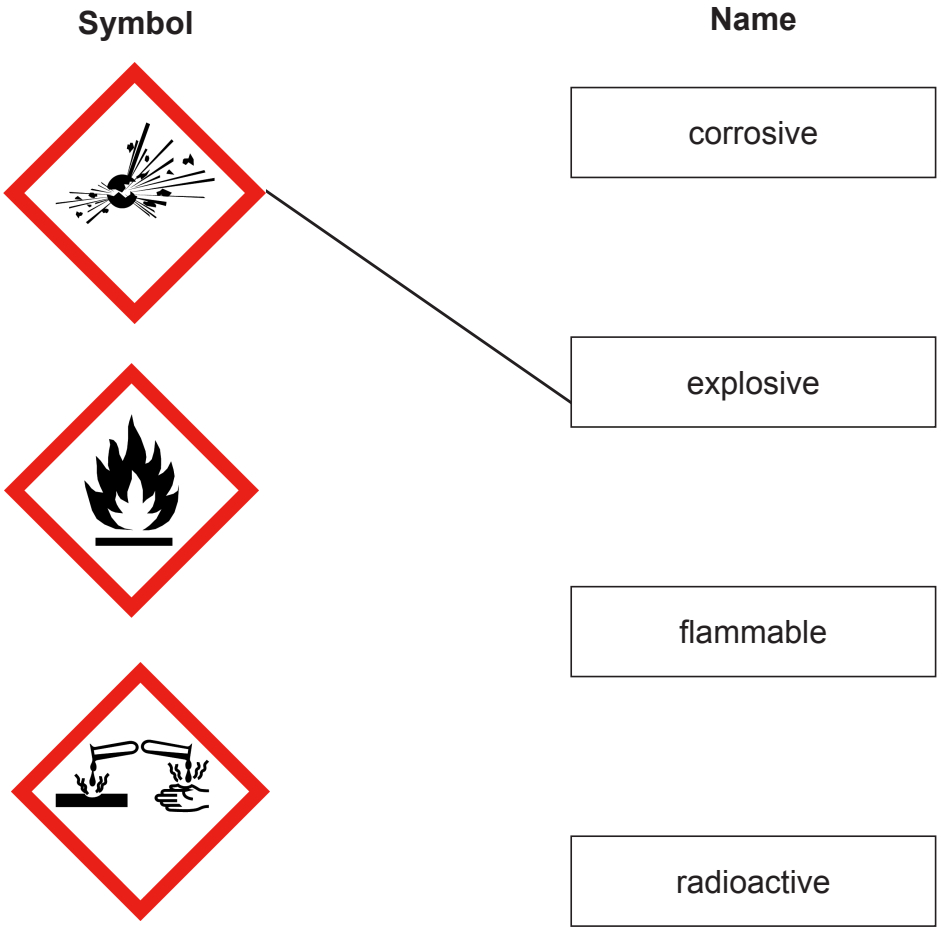
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Examiner Only	
Marks	Remark

1 Given below are some hazard symbols and their names.

(a) Using lines, match each symbol to its name.
One has been done for you.



© Crown copyright

[2]

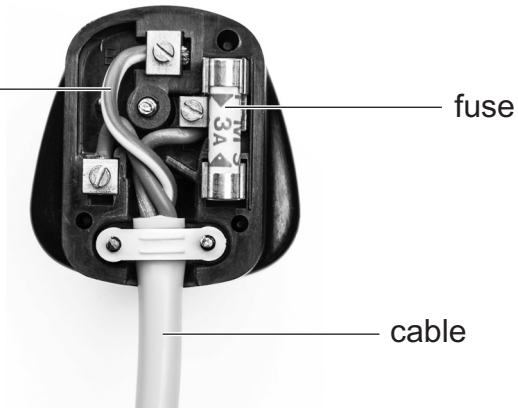
(b) What is the danger of a toxic substance?

_____

_____ [1]

Examiner Only	
Marks	Remark

2 Shown below is a picture of a plug from a lamp.



© Martyn F. Chillmaid / Science Photo Library

(a) Complete the sentences below about the materials used.

Choose from:

conductor **insulator** **plastic** **glass**

The wires in a plug are made from copper because it is a good _____ of electricity.

The cable to the plug is covered by the material _____. [2]

A fuse is used to make the lamp safe. The metal wire in the fuse must melt if there is too much electricity.

Below is some information about metals which may be used.

Metal	Melting point/°C	Cost per gram/£
Platinum	1768	26.28
Tungsten	3422	3.41
Lead	327	0.98
Copper alloy	398	3.34

(b) The wire must melt if the temperature reaches 330 °C.
Which metal should the fuse wire be made from? Explain your answer.

_____

_____

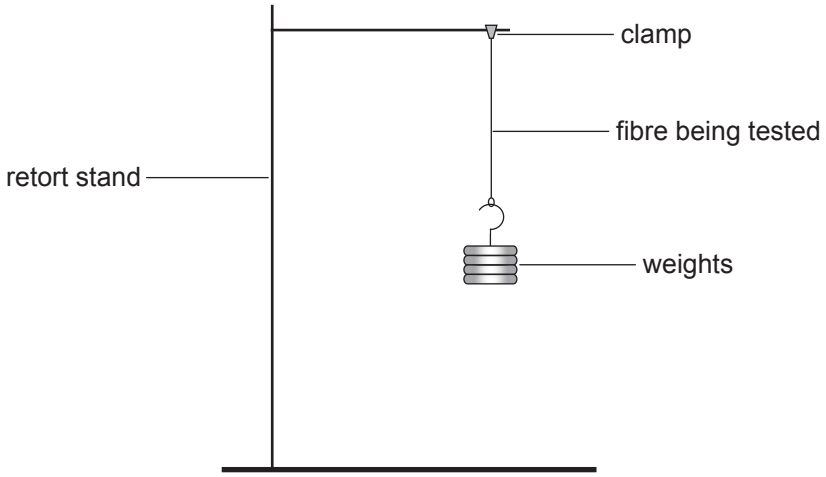
_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

3 A student carried out an investigation to test the strength of five different fibres. The apparatus he used is shown below.



(a) The maximum weight each fibre could hold before breaking was measured and recorded below.

Fibre	Maximum weight/N
Nylon	20
Linen	11
Silk	8
Lycra	25
Cotton	10

(i) Name the fibre which is strongest.

_____ [1]

(ii) Name the **two** synthetic (not natural) fibres that were tested.

_____ and _____ [1]

(b) Using the information and your knowledge, suggest **two** reasons why synthetic fibres are replacing natural fibres for clothing.

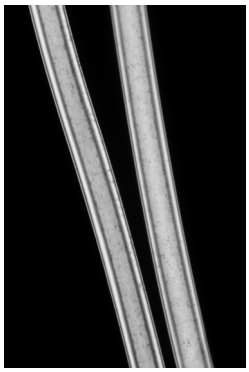
1. _____

2. _____ [2]

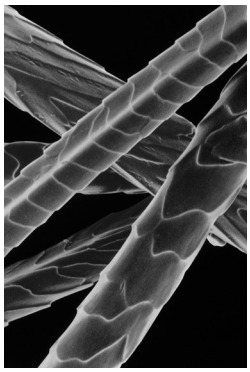
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Examiner Only	
Marks	Remark

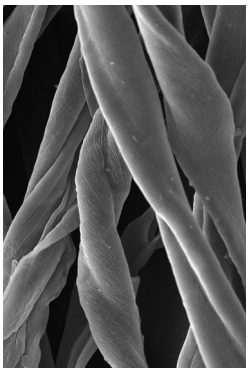
4 Below are images of different fibres as seen under a microscope.



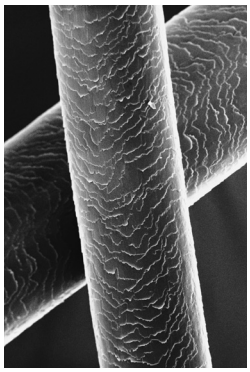
nylon



wool



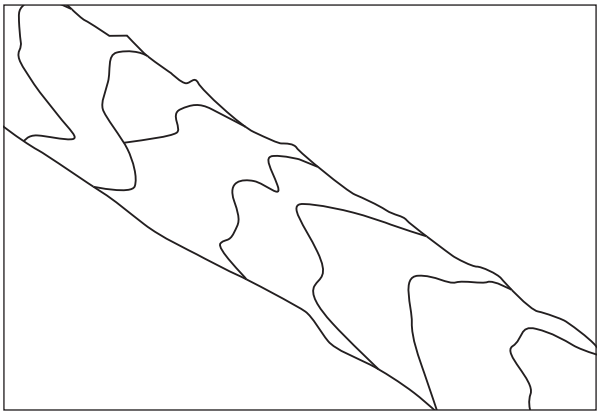
cotton



hair

© *Science Photo Library*

A scientist collected the fibre below from a crime scene.



(a) Using the images above, identify the fibre from the crime scene.

_____ [1]

(b) Scientists can also collect fingerprint evidence from a crime scene.

(i) Suggest **one** reason why fingerprints usually provide better evidence than fibres.

_____

_____ [1]

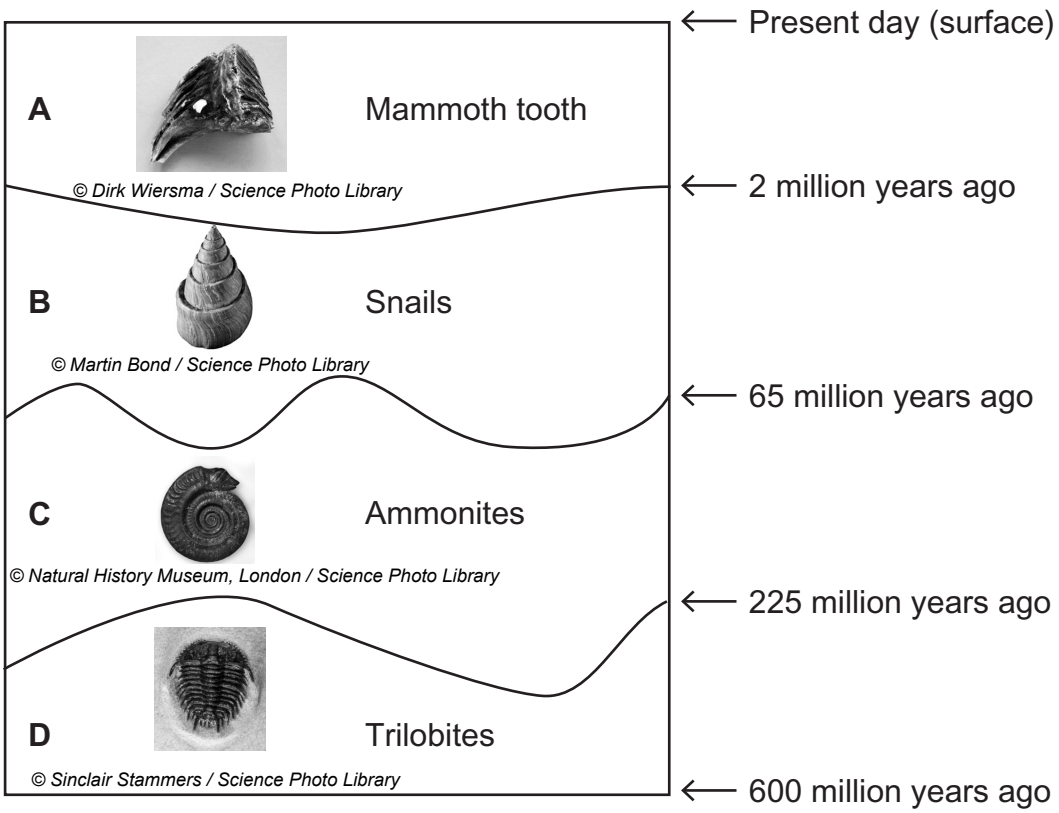
(ii) Whorl and composite are two types of fingerprint. Name the other **two** main types.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

5 Fossils are often found in rocks. Layers of rock of a similar age contain similar types of fossils. The diagram below gives the age of some layers of rock and the fossils found in them.



(a) Which layer of rock, **A**, **B**, **C** or **D** is the oldest?

_____ [1]

(b) A scientist found fossils of ammonites in a rock. What does this tell him about the age of this rock?

_____

_____ [1]

(c) Some trilobite fossils were found in rock on the surface of the Earth. Suggest why this rock is now on the surface.

_____

_____ [1]

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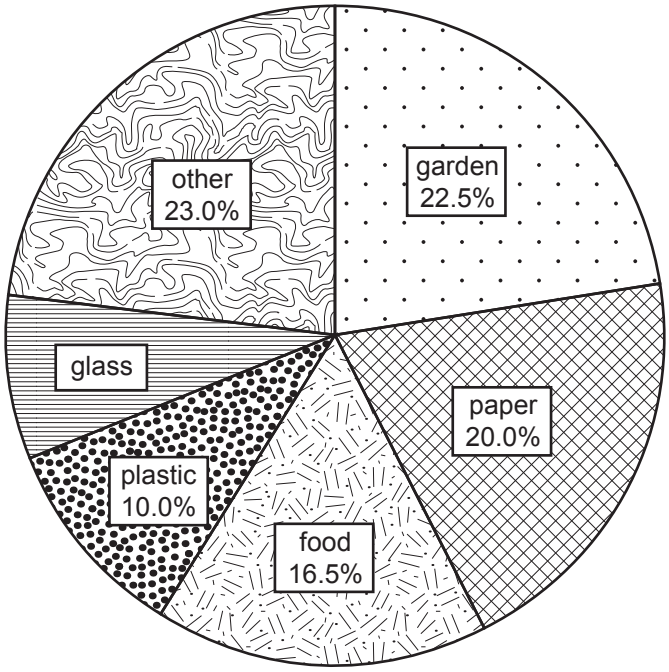
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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

6 The pie chart below gives information about the composition of waste in a household bin.



(a) Calculate the percentage of waste which is glass.

(Show your working out.)

_____ % [2]

(b) The Government is trying to encourage householders to cut down on waste by using the advertising campaign '*reduce, reuse and recycle*'. Using lines, match the following examples to the correct word.

Example	Word
use plastic bags more than once	reduce
use products with less packaging	reuse
	recycle

[2]

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(c) Glass is often recycled. Describe the steps in recycling waste glass after it has been delivered to the factory.

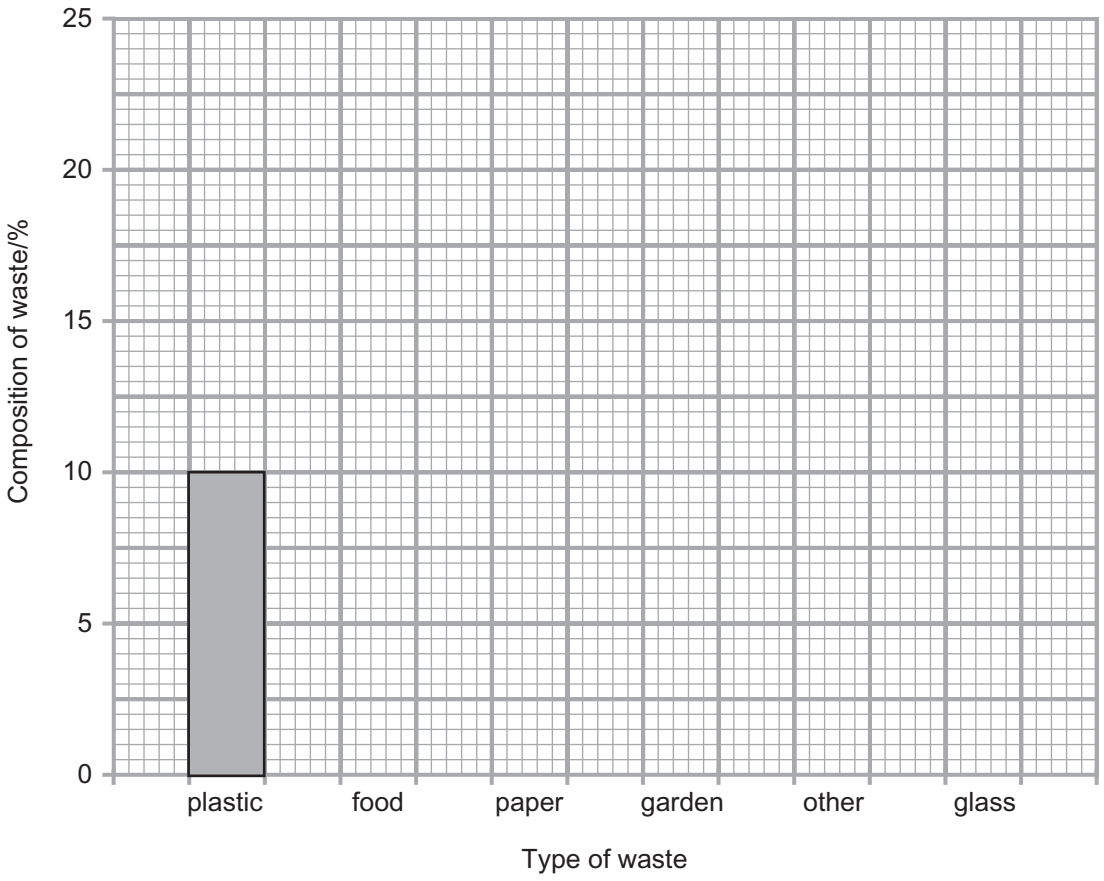
_____

_____

_____

_____ [3]

(d) Use the information opposite to complete the bar chart below.



[2]

(e) Give **two** ways local authorities and councils are encouraging recycling.

1. _____

_____

2. _____

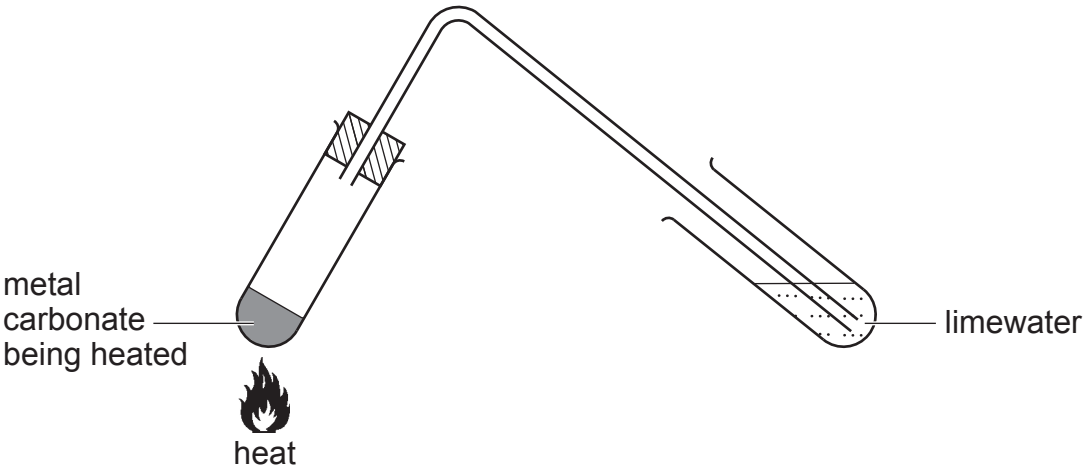
_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

7 A student investigated the effect of heat on different metal carbonates.
The diagram below shows the apparatus she used.



After two minutes she stops heating the test tube and allows it to cool before measuring the mass of the metal carbonate.
The results are shown below.

Chemical	Mass before heating/g	Mass after heating/g	Colour before heating	Colour after heating	Effect on limewater
copper carbonate	2.4	2.0	green	black	turns cloudy
manganese carbonate	2.6	2.1	pink	black	turns cloudy
sodium carbonate	2.5	2.5	white	white	none
zinc carbonate	2.7	2.1	white	white	turns cloudy

Examiner Only	
Marks	Remark

(a) Name a piece of apparatus that could be used to measure the mass of the metal carbonates.

_____ [1]

(b) Suggest why there is a loss in mass when copper carbonate is heated.

_____

_____ [1]

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(c) Name the metal carbonate that lost the most mass during this investigation.

_____ [1]

(d) Which metal carbonate did **not** decompose when heated?
Fully explain your answer.

_____

_____

_____

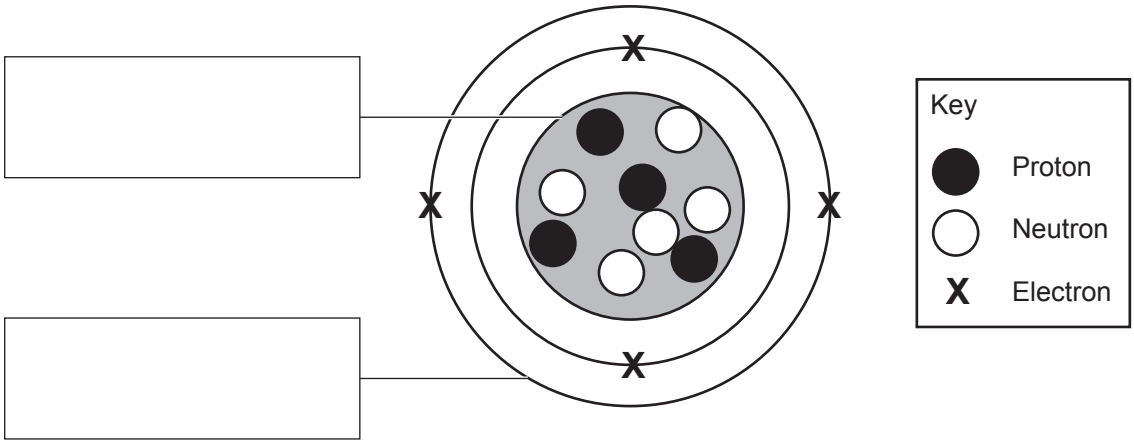
_____

_____ [3]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

8 The diagram below shows an atom of an element.



(a) Complete the diagram above by adding labels to the two boxes. [2]

(b) What is the **atomic number** of this element?

_____ [1]

(c) What is meant by the term **mass number**?

_____

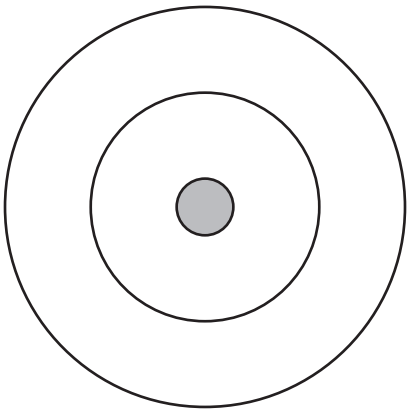
_____ [1]

(d) To which group of the Periodic Table does this element belong? Explain your answer in terms of its electronic structure.

_____

_____ [2]

(e) Oxygen has eight electrons. Complete the diagram below to show the electronic structure of oxygen.



[1]

(f) **(i)** Name the compound formed in the reaction between magnesium and oxygen.

_____ [1]

(ii) What is the name given to this type of reaction?

_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

9 The table below shows the percentage of the most common elements found in the igneous rocks in the Earth's crust.

Element	Percentage
Aluminium	8.1
Calcium	3.6
Iron	5.0
Magnesium	2.1
Oxygen	47.0
Phosphorus	0.1
Potassium	2.6
Silicon	28.0
Sodium	2.9
Titanium	0.6

Use the information in the table and your knowledge to answer the following questions.
You may find your Data Leaflet helpful.

(a) Igneous rocks are only one **type** of rock. Name the other two types.

_____ and _____ [2]

(b) Name the most common **metal** in the Earth's crust.

_____ [1]

(c) Calculate the total percentage of alkaline earth metals in the Earth's crust.

_____ % [1]

10 (a) Potassium and sodium are Group 1 metals. Compare their reactivity with water.

Your answer should include:

- two similarities between the reactions
- two differences between the reactions
- the products of one of the reactions

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

(b) Francium is another Group 1 metal. Explain fully why it is not used in the school laboratory to demonstrate the reactions of Group 1 metals with water.

[2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

11 Acid indigestion is caused by excess hydrochloric acid in the stomach. It can be treated using antacid tablets which contain sodium hydrogencarbonate.



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(a) Complete the word equation for the reaction between stomach acid and the antacid tablet.

sodium hydrogencarbonate + hydrochloric acid → [ ] + [ ] + [ ]

[3]

(b) Suggest one reason why antacid tablets do **not** contain sodium hydroxide.

_____

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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113159

Rewarding Learning

General Certificate of Secondary Education
2013–2014

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

THURSDAY 15 MAY 2014, MORNING

MARK SCHEME

STEMUP.CO.UK

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

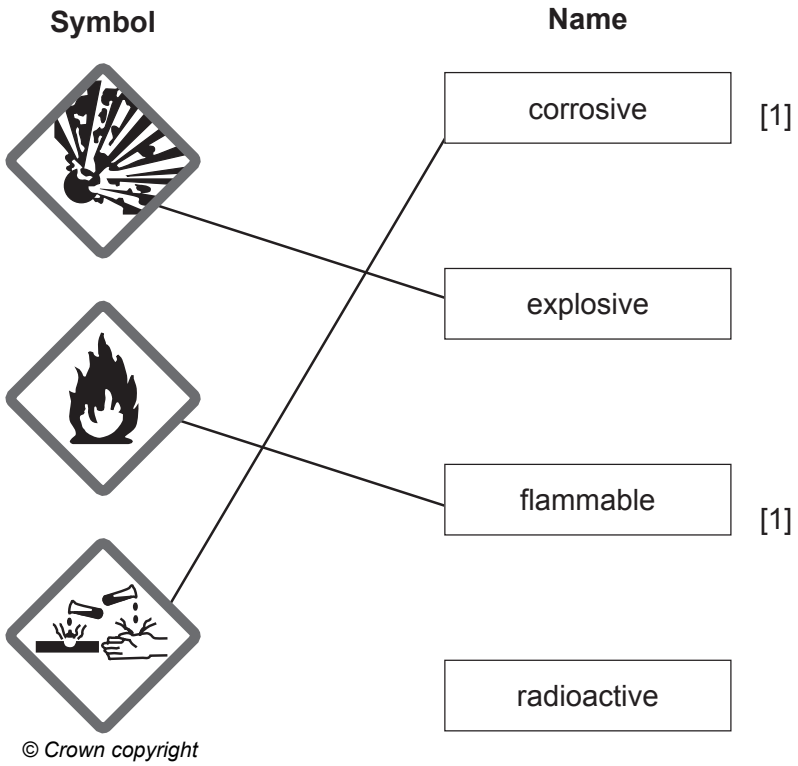
Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

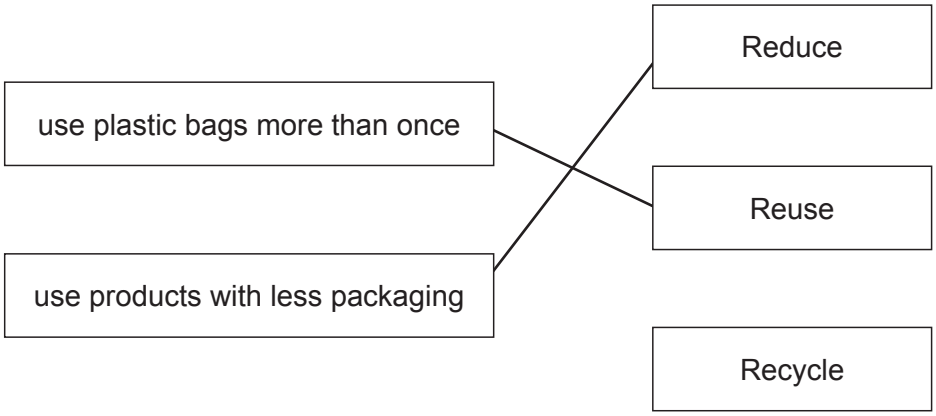
The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

				AVAILABLE MARKS
1	**(a)**	[1] for each correct line drawn  [1] [1] [2] © Crown copyright		
	(b)	Poisonous/kills if swallowed or inhaled/can kill	[1]	3
2	**(a)**	Conductor [1] plastic [1]	[2]	
	(b)	Lead [1] it will have melted at 330 °C [1]	[2]	4
3	**(a)**	**(i)** Lycra	[1]	
		(ii) Nylon **and** Lycra	[1]	
	(b)	Any two from: Synthetic materials are stronger/cheaper/better wearing	[2]	4
4	**(a)**	Wool	[1]	
	(b)	**(i)** Fingerprints are unique	[1]	
		(ii) Loop [1] Arch [1] (Any order)	[2]	4
5	**(a)**	D	[1]	
	(b)	Between 65 and 225 million years old	[1]	
	(c)	Earthquakes/weathering/erosion/mountain formation	[1]	3

				AVAILABLE MARKS
6	**(a)**	22.5 + 20 + 16.5 + 10 + 23 = 92 [1] Must be shown for N.C.M. 100 – 100 – 92 = 8% [1]	[2]	
	(b)			
		[1] for each line correctly drawn	[2]	
	(c)	Reprocessing of cullet/broken into pieces [1] use furnace/melt [1] remould [1]	[3]	
	(d)	4 bars plotted correctly [2] (3 bars plotted correctly [1]) (ignore bar plotted for glass)	[2]	
	(e)	**Any two**: providing recycling bins [1] separating metal from general waste [1] producing mulch from garden waste [1] charging businesses for using landfill/fines [1] providing recycling centres [1] advertising/education [1]	[2]	11
7	**(a)**	Balance/electronic scales (Not scale on own)	[1]	
	(b)	Carbon dioxide/a gas is given off	[1]	
	(c)	Zinc (carbonate)	[1]	
	(d)	Sodium (carbonate) [1] no decrease in mass [1] no effect on limewater [1] (penalise no change in colour)	[3]	6

				AVAILABLE MARKS
8	**(a)**	Nucleus [1] (electron) shell [1]	[2]	
	(b)	4	[1]	
	(c)	The number of protons **and** neutrons	[1]	
	(d)	Group 2 [1] the atom has two electrons in its outside shell [1]	[2]	
	(e)	2.6	[1]	
	(f)	**(i)** Magnesium oxide	[1]	
		(ii) Oxidation (accept combustion)	[1]	9
9	**(a)**	Sedimentary [1] metamorphic [1] (Any order)	[2]	
	(b)	Aluminium	[1]	
	(c)	5.7	[1]	4

10 (a) Indicative Content:

- Similarities: **two** from: metal floats on water, bubbles/fizzing/gas given off, moves on water, metal dissolves/disappears, exothermic
- Differences: **two** from: potassium more vigorous, faster, lilac flame
- Products: metal hydroxide and hydrogen [6]

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to compare the reactivity of potassium and sodium with water using **five or six** of the points above, in a logical sequence which includes a named product. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
B	Candidates use some appropriate specialist terms to compare the reactivity of potassium and sodium with water using **three to four** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates compare the reactivity of potassium and sodium with water using **one or two** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1–2]
D	Not worthy of credit.	[0]

(b) Francium is very/too reactive [1]
it would be dangerous [1] [2]

AVAILABLE MARKS: 8

11 (a) Sodium chloride [1]
water [1]
carbon dioxide [1] (Any order) [3]

(b) Sodium hydroxide is a strong alkali/too corrosive [1]

AVAILABLE MARKS: 4

Total **60**

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2013–2014

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

GSS21

TUESDAY 25 FEBRUARY 2014, MORNING

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 ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **9(b)**.
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 included for your use.

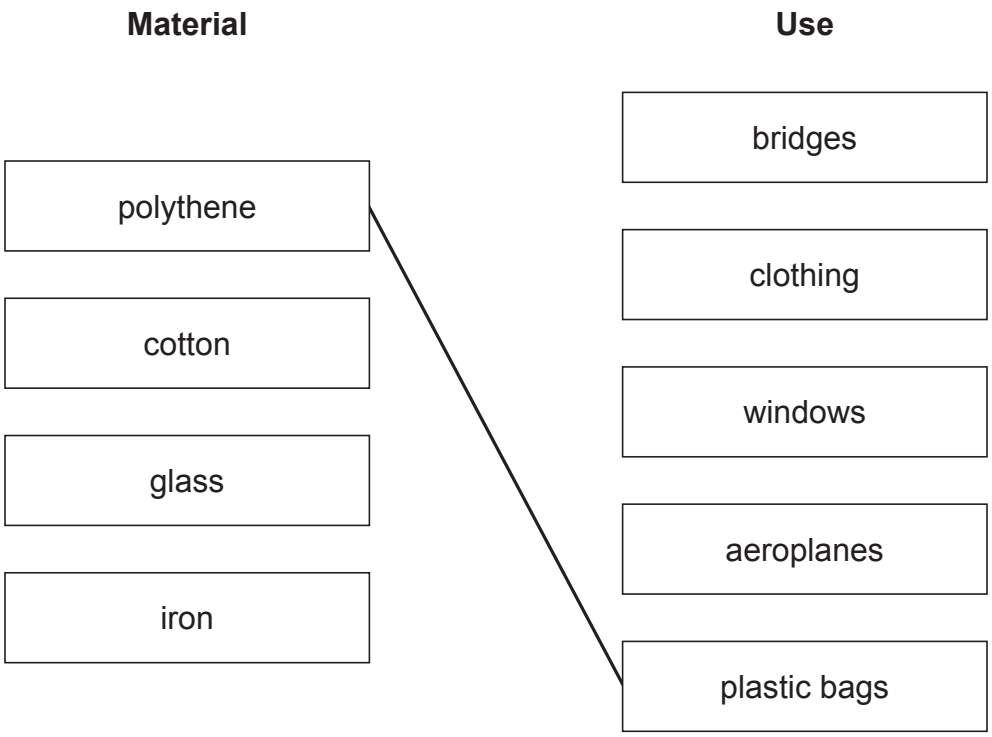
For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** Given below are some materials and their uses.

Using lines, match each material to **one** of its main uses.
The first has been done for you.



[3]

(b) Plastic is used to cover electrical wiring. What properties make plastic suitable for this use?

Circle **two** correct answers.

insulator **conductor** **flexible** **dense**

[2]

(c) Some materials produce new properties when their particle size is reduced.

What name is given to this type of material?

Choose from:

nanomaterial : **natural material** : **smart material**

_____ [1]

Examiner Only	
Marks	Remark

2 **(a)** Complete the table below about some household substances.

Substance	Chemical present	Acid or alkali
lemon juice		acid
	ethanoic acid	acid
Milk of Magnesia	magnesium hydroxide	

[3]

(b) Nicotine is found in cigarettes. It is a dangerous chemical. The hazard symbol below represents this danger.



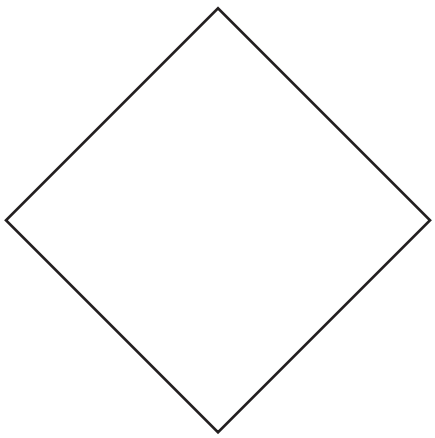
© Crown Copyright

Name this hazard symbol.

_____ [1]

(c) Oven cleaner contains a strong alkali which is corrosive.

Complete the hazard symbol below to show what you would expect to see on a bottle of oven cleaner.

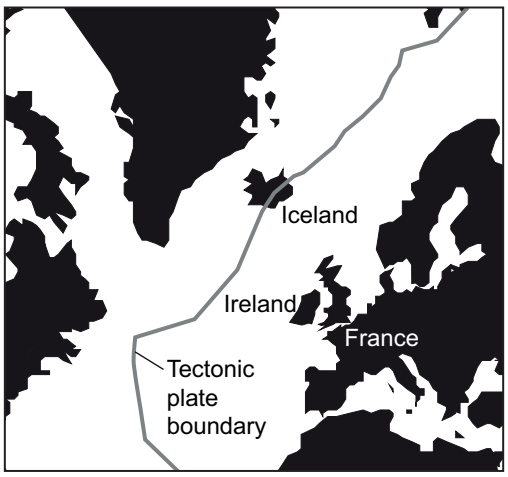


[1]

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Examiner Only	
Marks	Remark

3 The map below gives some information about tectonic plates.



© CCEA

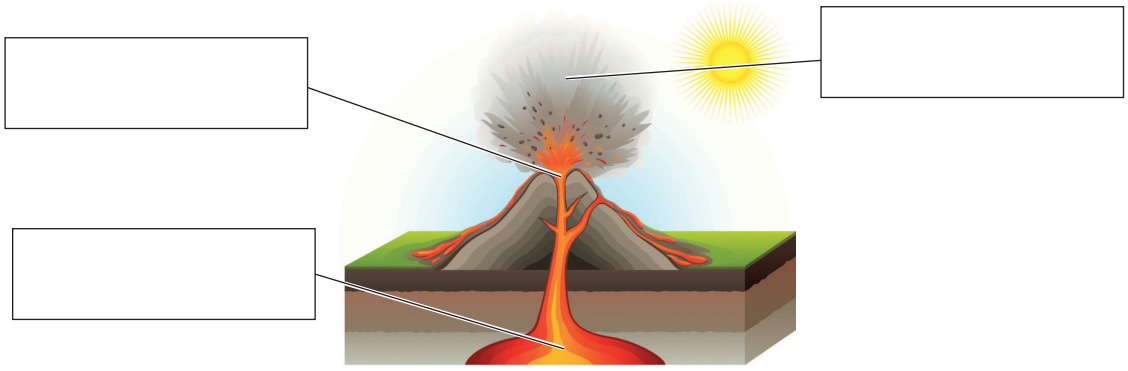
(a) Name the country, labelled above, where you would **most** expect a volcanic eruption to happen. Explain your answer.

_____

_____

_____ [2]

The diagram below shows a volcanic eruption.



© iStockphoto/Thinkstock

(b) Label the parts of the volcano shown above.

Choose from:

magma : lava : tectonic plate : dust and ash

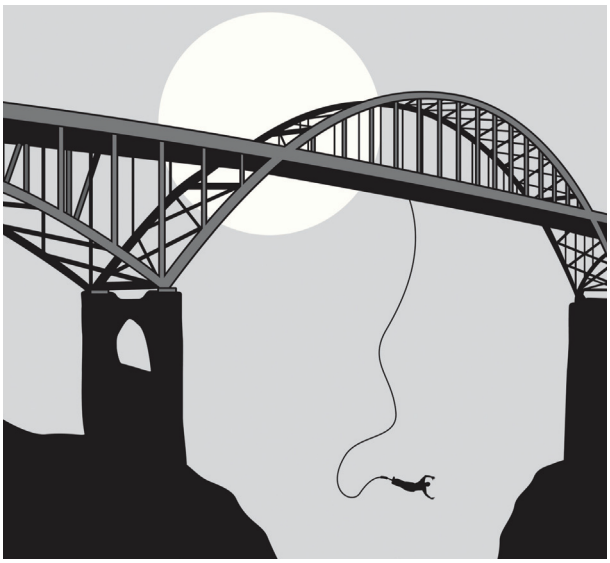
[3]

(c) Name the type of rock formed after a volcanic eruption.

_____ [1]

Examiner Only	
Marks	Remark

4 The picture below shows a rope being used in a bungee jump. The rope needs to be strong and have some elasticity.



© iStockphoto/Thinkstock

Some information about polymers that could be used for the rope is given below.

Polymer	Melting point/°C	Effect of sunlight	Other properties	Cost per kg/£
nylon	220	easily damaged	strong and very elastic	0.6
polyester	260	no damage	strong and quite elastic	2.0
polypropene	160	no damage	strong and not elastic	0.3

Which polymer named in the table would be most suitable to make a bungee rope? Explain your answer.

Polymer _____ [1]

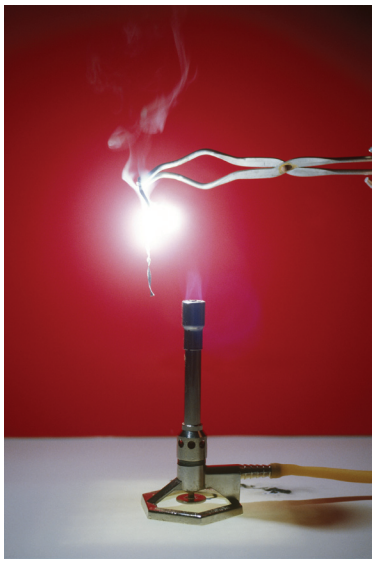
Explanation _____

_____

_____ [2]

Examiner Only	
Marks	Remark

5 The photograph below shows the elements magnesium and oxygen reacting to form magnesium oxide.



© Charles D Winters/Science Photo Library

(a) Below are some statements about magnesium. Tick (✓) the **two** statements that are correct.

You may find your Data Leaflet useful.

Statement	**Tick (✓)**
Magnesium is an alkali metal.	
Magnesium is an alkaline earth metal.	
Magnesium is a non-metal.	
Magnesium has an atomic number of 12.	
Magnesium has an atomic number of 24.	

[2]

(b) Magnesium oxide is described as a compound. What is meant by the term compound?

_____

_____ [2]

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(c) What is the chemical formula for magnesium oxide?

Circle the correct answer.

MgO_2 **MgO** **Mg_2O**

[1]

(d) Magnesium sulfate is another compound of magnesium. The chemical formula for magnesium sulfate is $MgSO_4$.

(i) How many different elements are in magnesium sulfate?

_____ [1]

(ii) How many atoms are represented in this formula?

_____ [1]

Examiner Only	
Marks	Remark

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6 The table below shows information about three different rocks.

	Limestone	**Granite**	**Sandstone**
Cost of quarrying	low	high	low
Usefulness as building material	good	good	good
Usefulness as a raw material for the chemical industry	very good	poor	poor
Ease of cutting it into shape	easy	difficult	easy
Effect of acid rain and weather	slowly reacts	no effect	very little effect

(a) Which **two** of the rocks named above are sedimentary rocks?

_____ and _____ [1]

(b) Which rock would be best to cut and use as garden paving slabs? Explain fully your answer.

_____

_____

_____

_____ [3]

Examiner Only

Marks	Remark

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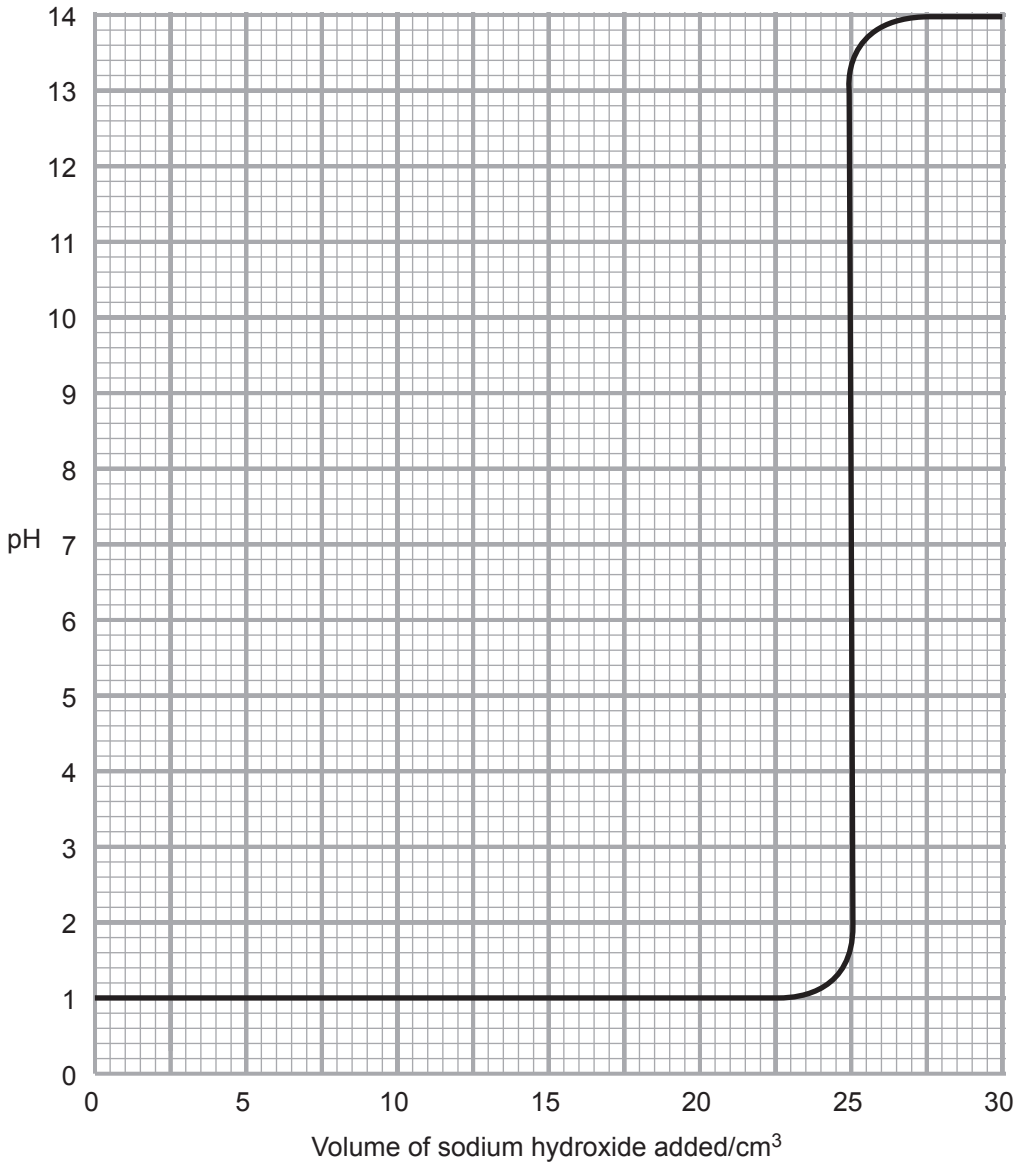
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Examiner Only	
Marks	Remark

7 A student was asked to investigate how the pH changed during the reaction between hydrochloric acid and sodium hydroxide. Sodium hydroxide solution was added to 25 cm^3 of dilute hydrochloric acid and the pH was recorded using a pH sensor.

The results are shown in the graph below.



(a) Use the graph to give:

(i) the pH of the hydrochloric acid before adding sodium hydroxide.

_____ [1]

(ii) the volume of sodium hydroxide required to neutralise the acid.

_____ cm^3 [1]

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(b) The student could also have investigated the pH change using universal indicator solution.

(i) What colour is universal indicator in a neutral solution?

_____ [1]

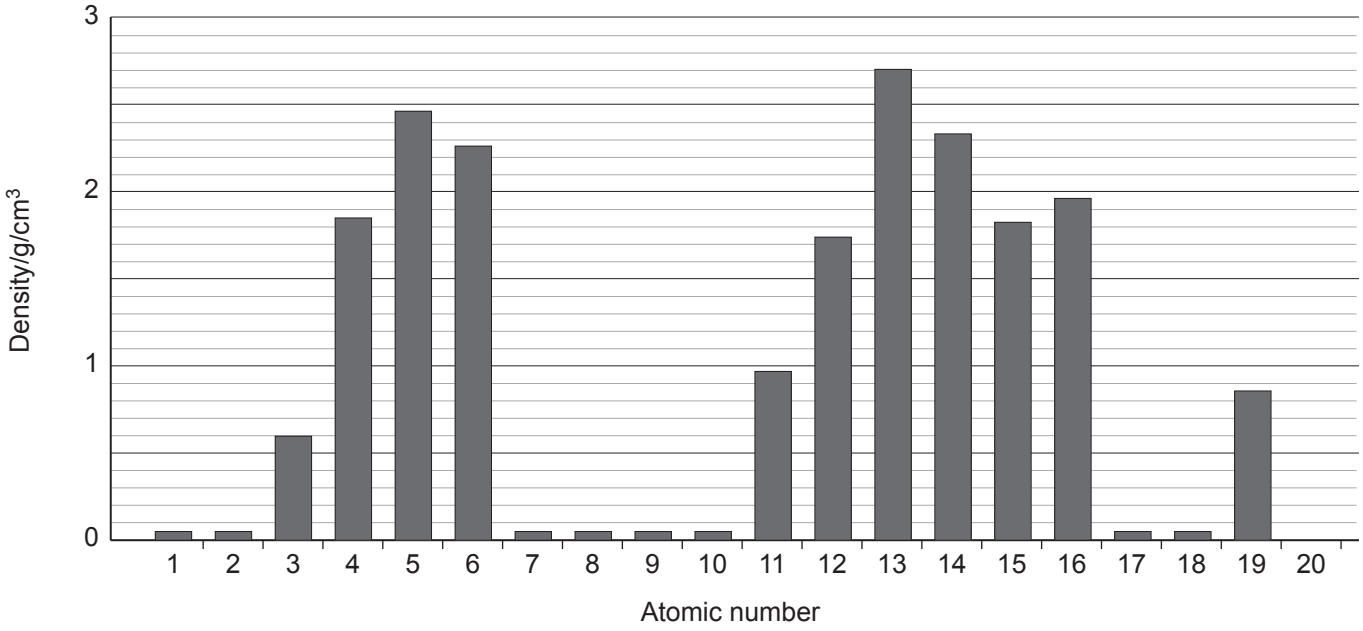
(ii) Give **one** advantage of using a pH sensor rather than universal indicator in this experiment.

_____ [1]

Examiner Only	
Marks	Remark

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8 Below is a graph showing the densities of the first nineteen elements of the Periodic Table.



Use the graph and your Data Leaflet to answer the following questions.

Examiner Only	
Marks	Remark

(a) What is the density of the element with atomic number 3?

_____ g/cm^3 [1]

(b) Name the element with the highest density and state the group of the Periodic Table to which it belongs.

Name _____ Group _____ [2]

(c) Suggest a value for the density of the element with atomic number 20.

_____ g/cm^3 [1]

(d) What do the elements with the lowest densities have in common?

Tick (✓) the correct answer.

☐ They are all metals.

☐ They are all gases.

☐ They are all in the same group of the Periodic Table. [1]

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Examiner Only	
Marks	Remark

9 Water can be described as hard or soft.

(a) What is meant by the term hard water?

_____

_____ [2]

(b) Fermanagh is a hard water area. Give the advantages and disadvantages of hard water for the people and the area. Your answer should include the cause of hard water and one method of softening it.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

Examiner Only	
Marks	Remark

10 A student investigated the reaction between sodium hydrogencarbonate and hydrochloric acid. He used the apparatus shown below to measure the mass of the beaker and its contents for seven minutes. The reaction produces carbon dioxide.

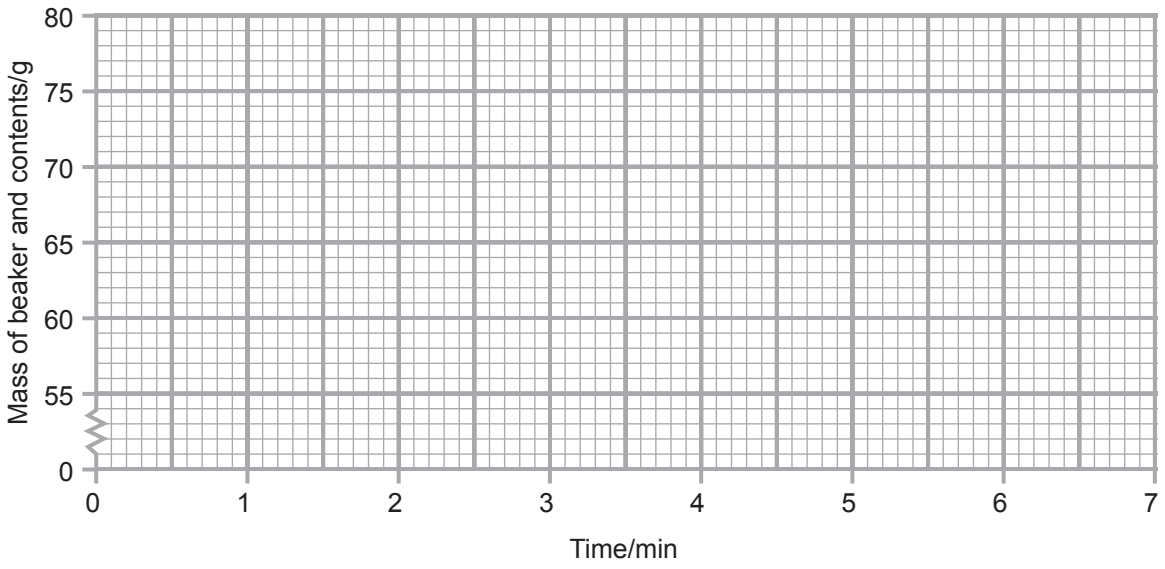


© Andrew Lambert Photography/Science Photo Library

His results are shown in the table.

Time/min	0	1	2	3	4	5	6	7
Mass of beaker and contents/g	80	69	64	61	59	58	58	58

(a) On the grid below plot these points and draw a curve of best fit.



[3]

(b) How did the student know that the reaction was finished?

_____ [1]

Examiner Only	
Marks	Remark

(c) Complete the word equation for this reaction.

sodium hydrogencarbonate + hydrochloric acid → carbon dioxide + [ ] + [ ]

[2]

(d) Describe the chemical test used to identify carbon dioxide and include the result you would expect.

_____

_____ [2]

(e) **(i)** Calculate the change in mass during this reaction.

_____ g [1]

(ii) Explain why the mass changed during the reaction.

_____

_____ [1]

(f) The student repeats the experiment using weaker ethanoic acid rather than hydrochloric acid.

Describe **one** similarity and **one** difference that would be observed during the reactions of each of these acids with sodium hydrogencarbonate.

_____

_____

_____

_____ [2]

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113159

Rewarding Learning

General Certificate of Secondary Education
2013–2014

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

TUESDAY 25 FEBRUARY 2014, MORNING

MARK SCHEME

STEMUP.CO.UK

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

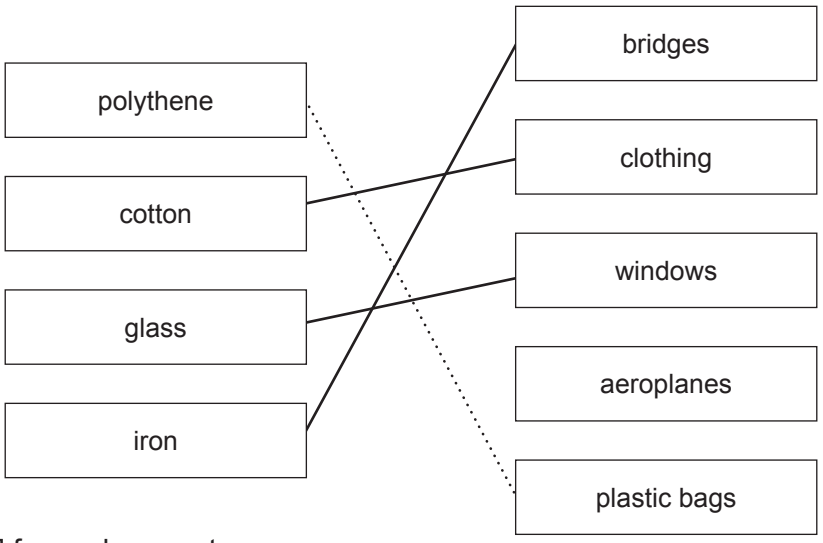
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It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

				AVAILABLE MARKS
1	**(a)**	**Material** / **Use**  [1] for each correct	[3]	
	(b)	insulator [1] flexible [1]	[2]	
	(c)	nanomaterial	[1]	6
2	**(a)**	citric acid [1] vinegar [1] alkali [1]	[3]	
	(b)	Toxic	[1]	
	(c)	Correct symbol for corrosive	[1]	5
3	**(a)**	Iceland [1] It is on the edge of tectonic plates at a plate boundary [1]	[2]	
	(b)	Diagram correctly labelled	[3]	
	(c)	Igneous	[1]	6
4		polyester no damage by sunlight [1] it is strong and quite elastic [1] penalise reference to melting point	[1] [2]	3

				AVAILABLE MARKS
5	**(a)**	Magnesium is an alkaline earth metal [1] magnesium has an atomic number of 12 [1]	[2]	
	(b)	Two (or more) elements/Two or more different atoms [1] (chemically) joined [1]	[2]	
	(c)	MgO	[1]	
	(d)	**(i)** 3 [1]		
		(ii) 6 [1]	[2]	7
6	**(a)**	Limestone and Sandstone either order	[1]	
	(b)	Sandstone [1] it is easy to cut into shape [1] acid rain has little effect [1]	[3]	4
7	**(a)**	**(i)** 1	[1]	
		(ii) 25 cm^3	[1]	
	(b)	**(i)** Green	[1]	
		(ii) More accurate/gives numbers	[1]	4
8	**(a)**	0.6	[1]	
	(b)	Aluminium [1] 3 [1]	[2]	
	(c)	1.0–1.7 g/cm^3	[1]	
	(d)	They are all gases	[1]	5

AVAILABLE MARKS

9 **(a)** Hard water is water that is difficult to lather/forms a scum [1] with soap [1] [2]

(b) Indicative Content:

- Advantages: better taste, helps form stronger bones/teeth
- Advantage: tourism, better for making beer
- Disadvantages: causes stains on washing, clogging water pipes, and fur in kettles
- caused by calcium/magnesium ions/compounds
- softened by, **one** from: thermal decomposition/distillation/ion exchange/ adding washing soda (if temporary, softened by boiling)

Band	Response	Marks
A	Candidates must use appropriate specialist terms throughout to describe hard water using **all** of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
B	Candidates use some appropriate specialist terms to describe hard water using **three to four** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
C	Candidates describe hard water using **one or two** of the above points. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 8

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		AVAILABLE MARKS
10 **(a)** All points plotted correctly [2] [7 points plotted correctly gains 1 mark] smooth curve drawn [1] [3]		
(b) No more loss in mass/no more bubbles/last values the same [1]		
(c) sodium chloride [1] water [1] (Any order) [2]		
(d) Use limewater [1] it turns milky/cloudy [1] [2]		
(e) **(i)** 22 g [1]		
(ii) The gas/carbon dioxide escaped from the beaker/given off [1]		
(f) Bubbles observed/loss in mass [1] slower/less vigorous reaction than with HCl [1] [2]		12
	Total	**60**

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2013–2014

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

GSS21

THURSDAY 14 NOVEMBER 2013, MORNING

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 ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **9**.
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 included in this question paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

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Examiner Only	
Marks	Remark

1 Hazard symbols are used to warn of danger.

The hazard symbol below is found on a bottle of bleach.



© Crown copyright – Health and Safety Executive

(a) Name this hazard symbol.

_____ [1]

(b) In the space below draw the hazard symbol you would find on a flammable liquid such as petrol.

[1]

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2 Aluminium is used to make aeroplanes.

Examiner Only	
Marks	Remark



© Ria Novosti / Science Photo Library

(a) What makes aluminium suitable for use in aeroplanes?
Tick (✓) **two** properties from the list below.

- ☐ Low density
- ☐ Strong
- ☐ Electrical conductor
- ☐ Soft
- ☐ Heat conductor

[2]

(b) Cotton, wool and silk are all examples of natural materials. What is meant by the term **natural material**?

_____

_____ [1]

(c) Glass fibre can be used to make car bodies. It combines the properties of two or more materials to make a more useful material.

What name is given to this type of material?

Circle the correct answer below.

ceramic : **composite** : **nano-material** [1]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

3 Fingerprints can be used to help fight crime.

(a) Name the two types of fingerprints shown below.

Choose from:

whorl **composite** **loop** **arch**

(i)



© iStock / Thinkstock

_____ [1]

(ii)



© iStock / Thinkstock

_____ [1]

(b) Name a powder used to dust for fingerprints on a **white** surface.

_____ [1]

(c) Explain fully why fingerprint evidence is useful in solving a crime.

_____

_____

_____ [2]

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(d) Give **three** features that banks use to protect their bank notes against forgery.

1. _____

2. _____

3. _____ [3]

(e) A flame test can be used to identify the metal present in a sample collected from a crime scene. What colour of flame would you expect if the sample contained potassium?

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

4 **(a)** Below are some chemicals and household substances. Using lines, match each chemical to the household substance in which it is found.

One has been done for you.

Chemical	Household substance
magnesium hydroxide	Milk of Magnesia
ethanoic acid	lemon juice
citric acid	drain cleaner
sodium hydroxide	vinegar

[2]

(b) The table below gives the soil pH that some plants grow best in.

Name of plant	pH of soil
Apple	5.0 – 6.5
Blackcurrant	7.5 – 8.5
Potato	5.5 – 6.5
Beetroot	6.0 – 8.0
Cabbage	9.0 – 10.0

(i) Name the plant that grows best in the most alkaline soil.

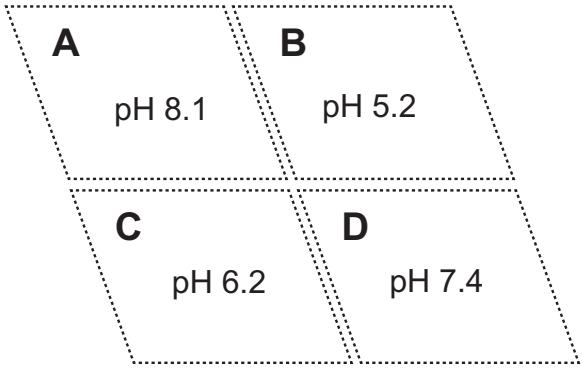
_____ [1]

(ii) Name the plant that is best suited to grow in both acid and alkaline soils.

_____ [1]

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A farmer tested the pH of the soil in his fields (**A**, **B**, **C** and **D**). His results are shown below.



(iii) He wants to grow potatoes. Which field (**A**, **B**, **C** or **D)** should he use? Explain your answer.

Field _____

_____

_____ [2]

(iv) He also wants to grow strawberries in field **B**. Strawberries grow best in soil with a pH of 7.

Explain fully why he needs to add lime to the soil in field **B**.

_____

_____

_____ [2]

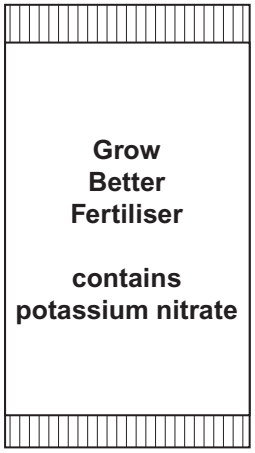
(v) What is the name given to a substance with a pH of 7?

_____ [1]

Examiner Only

Marks	Remark

(c) Farmers add fertiliser to their soil to help their plants grow better.



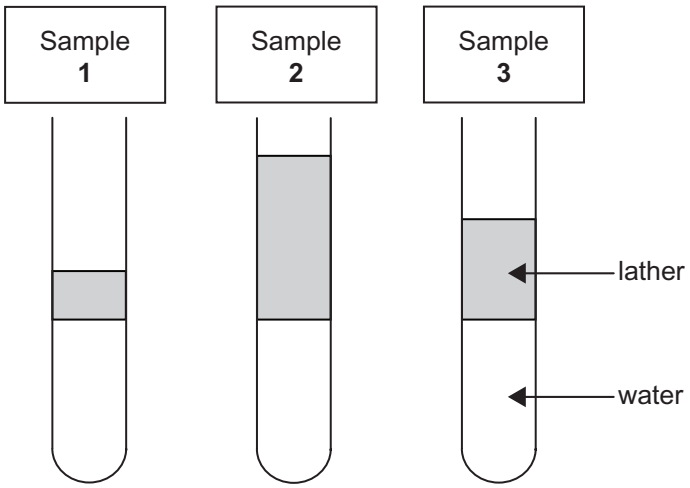
Potassium nitrate (KNO_3) contains potassium and two other elements.
Name the other **two** elements.

_____ and _____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 A student investigated the hardness of three samples of water. She added 5 drops of soap solution to 10 cm^3 of water and shook for 10 seconds. Her results are shown below.



(a) Explain **one** way in which the student made this a fair test.

_____

_____ [1]

(b) Name a piece of apparatus she could have used to measure 10 cm^3 of water.

_____ [1]

(c) Which sample (**1**, **2** or **3**) contained the hardest water?

_____ [1]

(d) Circle the compound that may cause hard water.

calcium sulfate : **iron sulfate** : **copper sulfate** [1]

Examiner Only	
Marks	Remark

6 The table below shows some waste materials produced in Belfast in one year.

Material	Waste produced/ tonnes
paper	16 500
plastic bottles	4 500
glass	6 000
food and garden waste	33 000
aluminium cans	3 500
cardboard	7 500

(a) In Belfast 50% of the paper waste is recycled.

Calculate the number of tonnes of paper waste that is recycled in one year.
(Show your working out.)

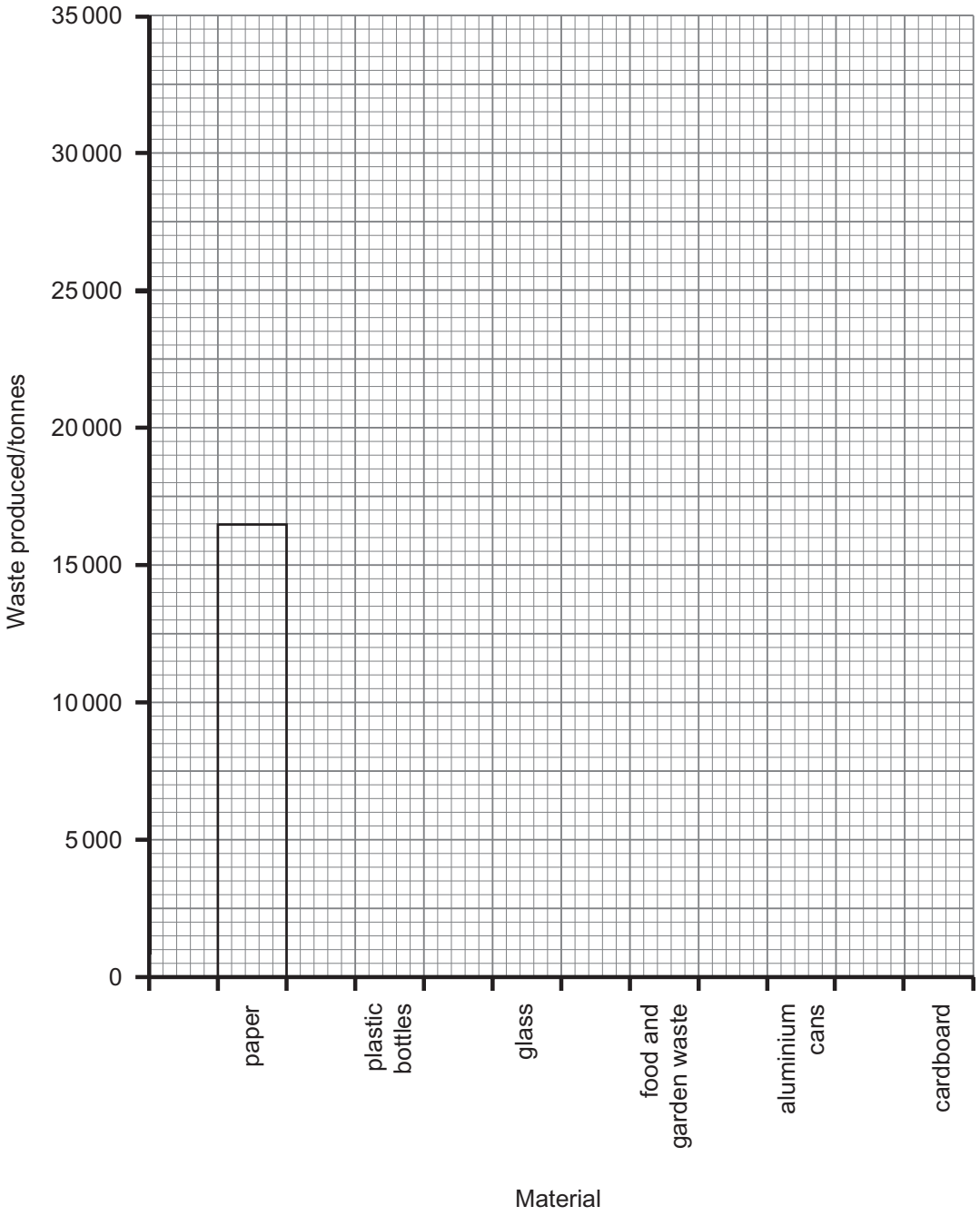
_____ tonnes [2]

(b) Give **one** advantage of recycling.

_____ [1]

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(c) Complete the bar chart below for this information.

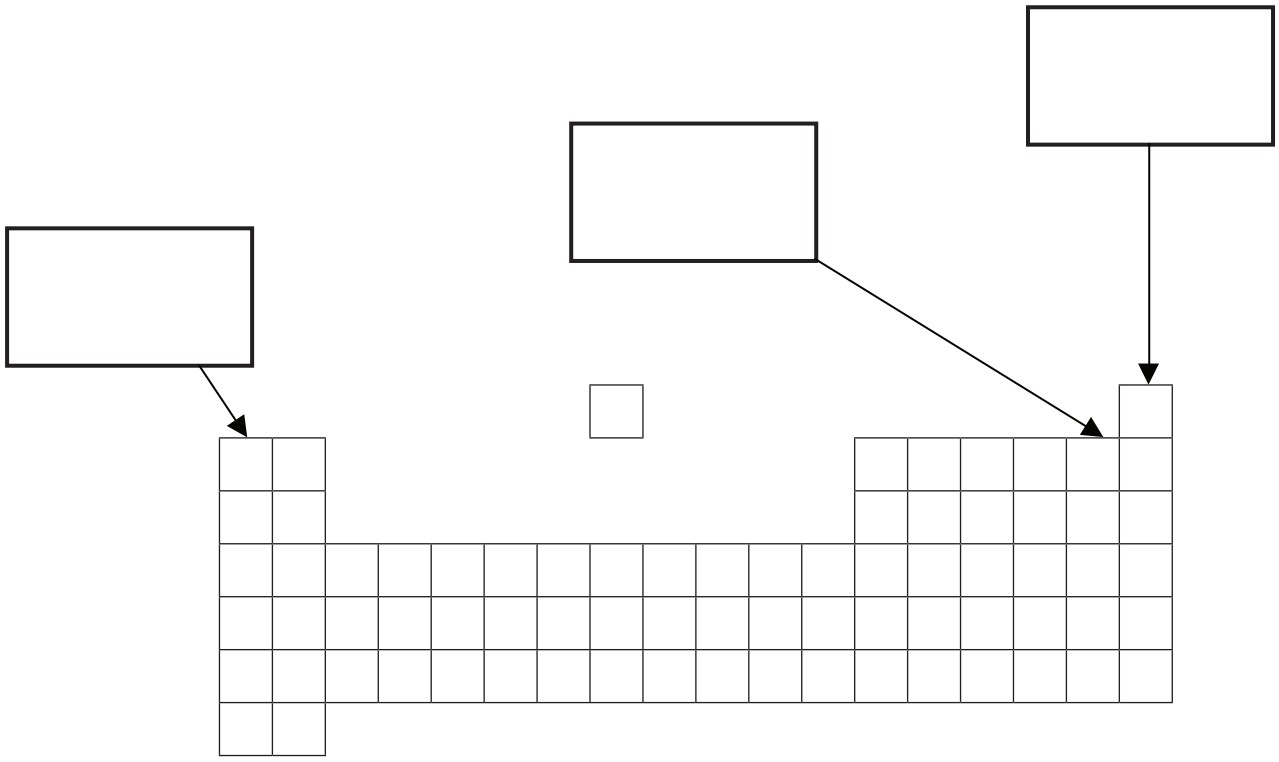


[2]

Examiner Only	
Marks	Remark

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7 Below is an outline of the Periodic Table.



Examiner Only	
Marks	Remark

(a) On the diagram above complete the three boxes to name the Groups of the Periodic Table shown.

Choose from:

alkaline earth metals : halogens : alkali metals : noble gases

[3]

(b) Name the scientist who developed a Periodic Table most similar to the one outlined above.

_____ [1]

(c) Complete the following sentence to describe a **trend** in the Periodic Table.

The metallic character of the elements _____ from left to right across the Periodic Table. [1]

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Examiner Only	
Marks	Remark

8 A student investigates the reactivity of four metals: iron, magnesium, zinc and tin.

He added 1 g of each powdered metal to equal volumes of copper sulfate solutions and measured the temperature rise. The larger the temperature rise the more reactive the metal.

The results are shown below.

Metal	Starting temperature/ °C	Highest temperature/ °C	Temperature rise/ °C
iron	20	52	32
magnesium	21		50
zinc	19	60	41
tin	20	41	21

(a) Calculate the highest temperature for the reaction with magnesium.

_____ °C [1]

(b) Name the metal in the table that is the **least** reactive.

_____ [1]

(c) **(i)** Complete the word equation for the reaction between iron and copper sulfate.

iron + copper sulfate → [ ] + [ ]

[2]

(ii) What is the name given to this type of reaction?

_____ [1]

(d) The student carried out the same experiment using 1 g of powdered silver metal. There was no temperature rise. Suggest a reason why there was no temperature rise.

_____

_____ [1]

(e) The chemical formula for copper sulfate is $CuSO_4$.

(i) How many elements are present in copper sulfate?

_____ [1]

(ii) How many atoms are represented in this formula?

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

9 Indigestion can cause severe stomach pain.



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'Fasteze' indigestion tablets contain sodium hydrogencarbonate.

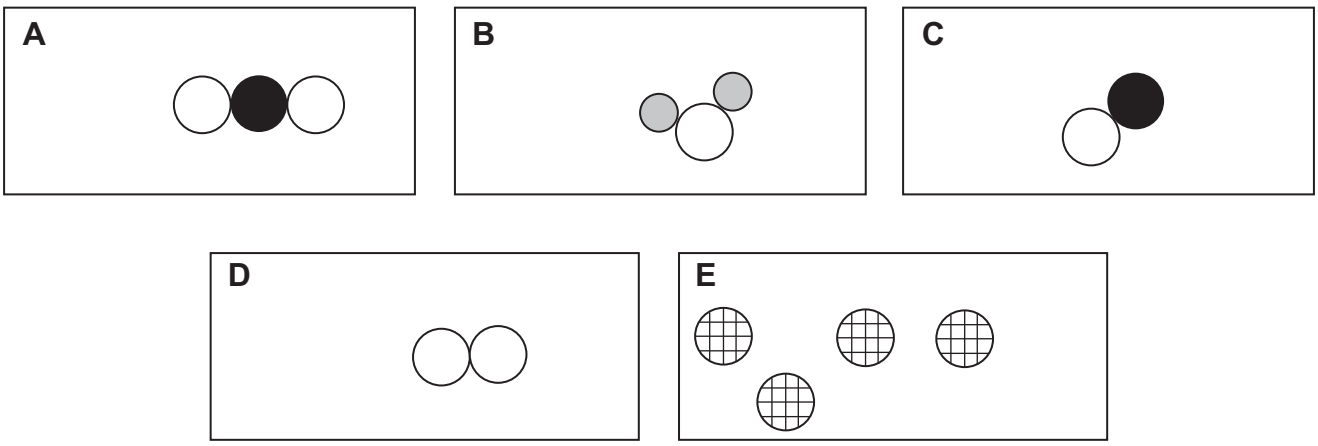
Explain how indigestion tablets such as 'Fasteze' work. Your answer should include:

- the cause of stomach indigestion
- how indigestion tablets work
- the names of the chemicals produced during this reaction.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

10 Shown below are some particle diagrams that represent elements or compounds.



Examiner Only	
Marks	Remark

(a) Which particle diagrams (**A, B, C, D** or **E**) show compounds? Explain your answer.

Diagrams _____

_____

_____ [2]

(b) Atoms of argon do not join with any other atoms. Which diagram (**A, B, C, D** or **E**) best represents argon?

_____ [1]

(c) Carbon monoxide has the formula CO. Which diagram (**A, B, C, D** or **E**) best represents carbon monoxide?

_____ [1]

(d) Hydrogen atoms are smaller than any other atoms. Which diagram (**A, B, C, D** or **E**) best represents water (H_2O)? Explain your answer.

_____

_____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

General Certificate of Secondary Education
2013–2014

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

THURSDAY 14 NOVEMBER 2013, MORNING

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STEMUP.CO.UK

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	AVAILABLE MARKS

1 **(a)** Toxic [1]

(b) Correct drawing for flammable [1] — 2

2 **(a)** Low density [1]
strong [1] [2]

(b) Obtained from living things/do not need to be processed by chemical methods [1]

(c) Composite [1] — 4

3 **(a)** **(i)** Whorl [1]

(ii) Loop [1]

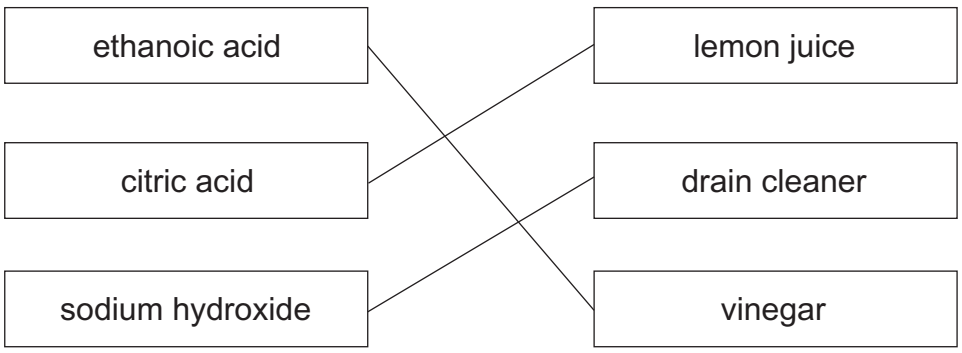
(b) Carbon (black) [1]

(c) Fingerprints are unique [1]
they can be collected from crime scene/compared to suspect/ compared to a database [1] [2]

(d) **Any three from:**
- quality of paper/does not fluoresce under UV light
- watermarks
- metal strip
- bar-coding/number coding
- holograms
- special ink [3]

(e) Lilac [1] — 9

4 **(a)**



[2]

[1/2 correct = 1 mark, 3 correct = 2 marks]

				AVAILABLE MARKS
	(b)	**(i)** Cabbage	[1]	
		(ii) Beetroot	[1]	
		(iii) C [1] pH of field is in range 5.5–6.5 [1]	[2]	
		(iv) Field is acidic/Lime is an alkali [1] pH needs to increase/lime will make it neutral [1]	[2]	
		(v) Neutral	[1]	
	(c)	Nitrogen [1] oxygen [1] either order	[2]	11
5	**(a)**	Same amount soap/water/shaken for same time (Same is essential)	[1]	
	(b)	Measuring cylinder/pipette/burette or other suitable	[1]	
	(c)	Sample 1	[1]	
	(d)	Calcium sulfate	[1]	4
6	**(a)**	16 500 × 0.5 [1] 8250 [1]	[2]	
	(b)	Saves energy/raw materials/reduces landfill sites	[1]	
	(c)	5 bars correct [3 or 4 bars correct = 1]	[2]	5
7	**(a)**	Alkali metals [1] halogens [1] noble gases [1]	[3]	
	(b)	(Dmitri) Mendeleev	[1]	
	(c)	Decreases	[1]	5

	AVAILABLE MARKS

8 **(a)** 71 [1]

(b) Tin [1]

(c) **(i)** Iron sulfate [1]
copper [1] either order [2]

(ii) Displacement [1]

(d) Silver is unreactive [1]

(e) **(i)** 3 [1]

(ii) 6 [1] 8

9 **Indicative Content:**

- indigestion is caused by excess stomach acid
- stomach acid is hydrochloric acid
- indigestion tablets contain an alkali/base
- alkali neutralises the acid/neutralisation reaction
- sodium chloride
- water
- carbon dioxide

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe indigestion using **five to seven** of the points above, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
B	Candidates use some appropriate specialist terms to describe indigestion using **three to four** of the points above, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates describe indigestion using **one or two** of the points above. However, these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and have made limited use of specialist terms. The form and style are of a limited standard.	[1–2]
D	Not worthy of credit.	[0]

6

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			AVAILABLE MARKS
10	**(a)** A, B and C [1] A compound has two or more elements chemically joined [1]	[2]	
	(b) E	[1]	
	(c) C	[1]	
	(d) B [1] 3 atoms, 2 smaller than the other [1]	[2]	6
		Total	**60**

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2012–2013

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

GSS21

MONDAY 20 MAY 2013, AFTERNOON

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 ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **9**.
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 included in this question paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** Below are some hazard symbols. Using lines, match each symbol to its correct meaning.

The first one has been done for you.

Hazard symbol	Meaning
	corrosive
	toxic
	radioactive
	explosive
	flammable

[3]

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(b) Suggest why hazard symbols are better than words to warn people of dangers.

_____

_____ [1]

2 Complete the following sentences.

Choose from:

Richter **boundary** **tectonic** **seismometer** **tidal**

Volcanoes and earthquakes are caused by movement at the edge of _____ plates. Earthquakes are recorded on an instrument called a _____. The size of earthquakes is measured on the _____ scale. [3]

Examiner Only	
Marks	Remark

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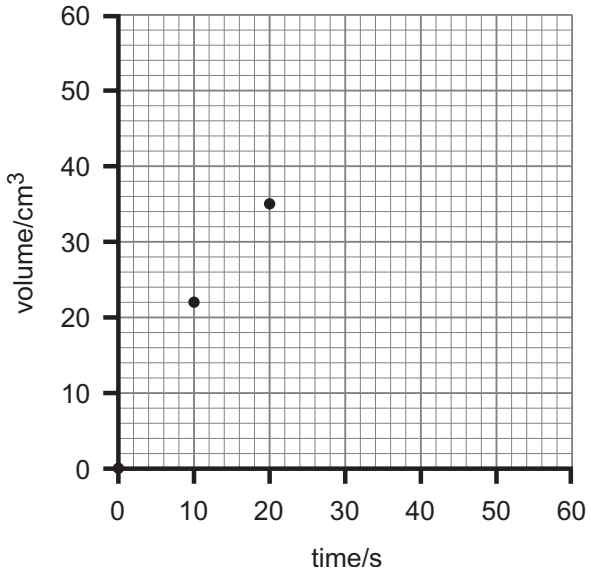
Examiner Only	
Marks	Remark

3 Ashley carried out an investigation into the volume of carbon dioxide given off when baking powder is added to acid.

Her results are shown below.

Time/s	0	10	20	30	40	50	60
Volume/cm^3	0	22	35	42	48	50	50

(a) On the grid below plot the rest of the points and draw a curve of best fit.



[2]

(b) Use your graph to find how long it took to produce 30 cm^3 of gas.

_____ s [1]

(c) Describe the chemical test used to identify carbon dioxide and include the result you would expect.

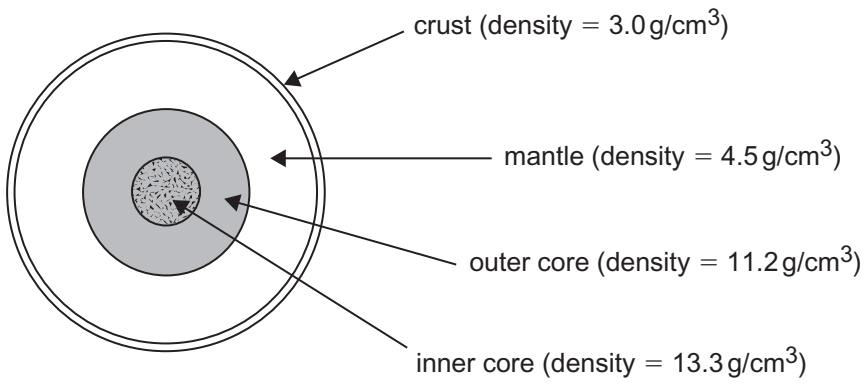
_____

_____

_____ [2]

4 The table and the diagram below give information about the structure of the Earth.

Layer	Volume/%	Depth from Earth's surface/km
crust	1.5	40
mantle	82.3	2900
outer core	15.4	5150
inner core	0.8	6370



(a) Which layer has the smallest volume?

_____ [1]

(b) Which layer has the highest density?

_____ [1]

(c) Which is the thinnest layer?

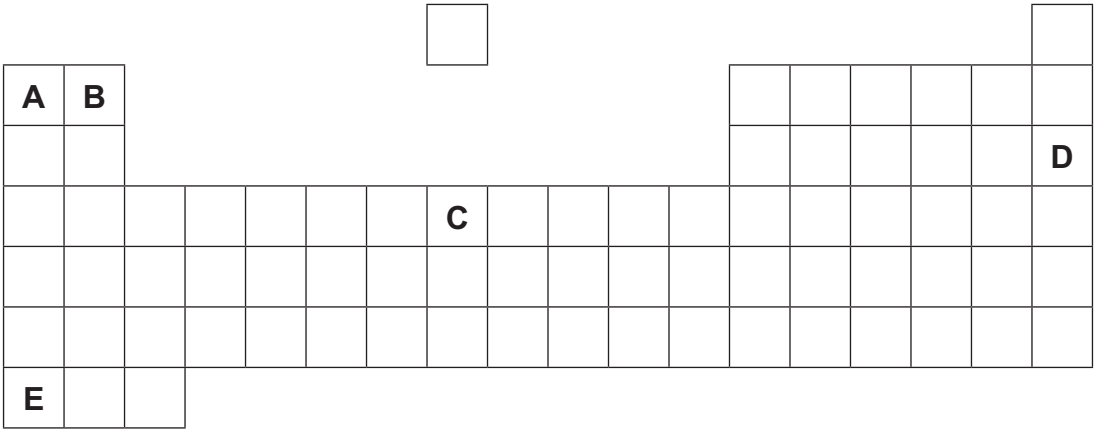
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

5 **(a)** The diagram below shows an outline of the Periodic Table. The letters **A**, **B**, **C, D** and **E** represent the position of some elements.



Which element **A**, **B**, **C, D** or **E** is:

(i) an alkaline earth metal? _____ [1]

(ii) a gas? _____ [1]

(iii) the most reactive metal? _____ [1]

(b) On the diagram above use the letter **X** to show **one** position where you would find a halogen. [1]

(c) Complete the following sentences by circling the correct answer.

(i) Lithium, sodium and potassium are all

noble gases : alkali metals : halogens [1]

(ii) The formula for sodium chloride is

$NaCl_2$: NaCl : Na_2Cl [1]

(iii) The modern Periodic Table was developed by

The Greeks : Newlands : Mendeleev [1]

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Marks	Remark

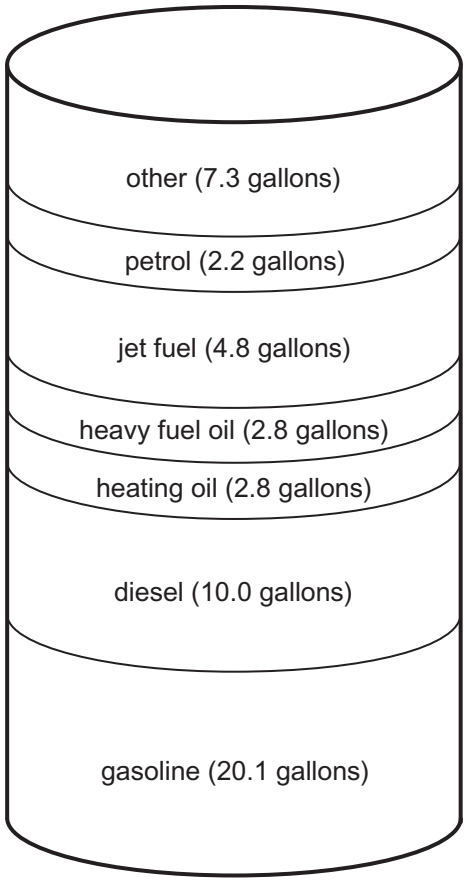
6 **(a)** Crude oil is a liquid fossil fuel. Describe fully what crude oil is.

_____

_____

_____ [2]

(b) The diagram below shows the chemicals that can be made from **one** barrel of crude oil.



barrel of crude oil

(i) Name the process used to separate crude oil into these different chemicals.

_____ [2]

(ii) A car uses 250 gallons of diesel in one year. Calculate how many barrels of crude oil will be needed to produce the car's fuel for one year.
(Show your working out.)

_____ barrels [2]

(iii) Some of the other chemicals in crude oil can be changed into diesel. What effect, if any, will this have on the number of barrels needed to fuel the car for one year? Explain your answer.

_____

_____

_____

_____ [2]

(c) Complete the word equation below for the complete combustion of diesel fuel.

diesel fuel + oxygen → [ ] + [ ]

[2]

Examiner Only

Marks	Remark

7 The table below shows properties of some plastics.

Plastic	Melting point/°C	Resistance to alkali	Other properties	Cost per kg /£
A	20	highly resistant	strong and flexible	1.1
B	120	slowly reacts	strong and flexible	1.5
C	200	highly resistant	strong and shatters easily	0.5
D	160	highly resistant	strong and not very flexible	2.4

Use the information in the table and your knowledge to answer the questions below.

(a) Suggest why plastic **C** is **not** suitable to cover the copper wire in an electrical cable.

_____

_____ [1]

(b) A company has a large warehouse and wants to use plastic sheets to cover the items it stores. Explain why plastic **B** is a better choice than plastic **D**.

_____

_____ [1]

(c) Large plastic containers are needed to transport a corrosive alkali. The containers will be loaded on and off lorries.

Which plastic (**A**, **B**, **C** or **D**) would be most suitable? Explain your answer fully.

_____

_____

_____

_____ [3]

Examiner Only

Marks	Remark

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8 **(a)** Complete the table below about the particles in an atom.

Particle	Relative charge	Relative mass	Location in an atom
proton	+1		the nucleus
electron		$\frac{1}{1840}$	orbits the nucleus
neutron	0	1	

[3]

(b) Given below is the atomic number and mass number of sodium.

$$\begin{matrix} 23 \\ 11 \end{matrix} \mathbf{Na}$$

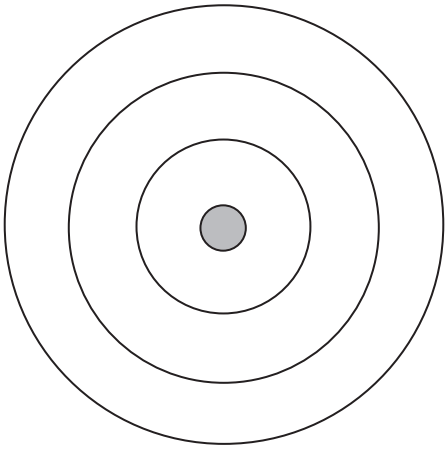
(i) How many protons does an atom of sodium have?

_____ [1]

(ii) Calculate the number of neutrons in an atom of sodium.

_____ [1]

(iii) An atom of sodium has 11 electrons. Complete the diagram below to show how all its electrons are arranged.



[1]

Examiner Only

Marks	Remark

9 Potassium is a very reactive metal. Describe how a teacher could **safely** demonstrate its reaction with water to a class of pupils. Your answer should include what is observed and the names of any products.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

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10 The table below gives the colour of four indicators at different pH values.

Indicator	pH value													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Universal	R	R	O	O	Y	Y	G	B	B	I	I	I	V	V
Methyl Red	R	R	R	R	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Thymol Blue	Y	Y	Y	Y	Y	Y	Y	Y	B	B	B	B	B	B
Alizarin Yellow	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	R	R	R

Key
R=Red O=Orange Y=Yellow G=Green B=Blue I=Indigo V=Violet

Use the information above to answer the following questions.

Examiner Only	
Marks	Remark

(a) (i) What colour is Methyl Red indicator in a solution of pH 7?

_____ [1]

(ii) What colour is Alizarin Yellow indicator in strong alkali?

_____ [1]

(iii) What colour is Universal indicator in hydrochloric acid?

_____ [1]

(b) A scientist has some acid and is going to add an alkali to it. He needs to stop adding the alkali when the pH value is 7.

(i) What name is given to the reaction of an acid with an alkali?

_____ [1]

(ii) From the table above select the most suitable indicator for his experiment. Explain your choice.

_____

_____

_____ [2]

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(c) The table shows chemical indicators. Suggest a more accurate way to follow the pH change when an alkali is added to an acid.

_____ [1]

(d) Most indicators are made from plants. Describe how you would obtain an indicator from red cabbage.

_____

_____

_____

_____

_____ [3]

(e) Complete the word equation below for the reaction of an acid with an alkali.

hydrochloric acid + magnesium hydroxide → [ ] + water

[1]

Examiner Only

Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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113159

Rewarding Learning

General Certificate of Secondary Education
2012–2013

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

MONDAY 20 MAY 2013, AFTERNOON

MARK SCHEME

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General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

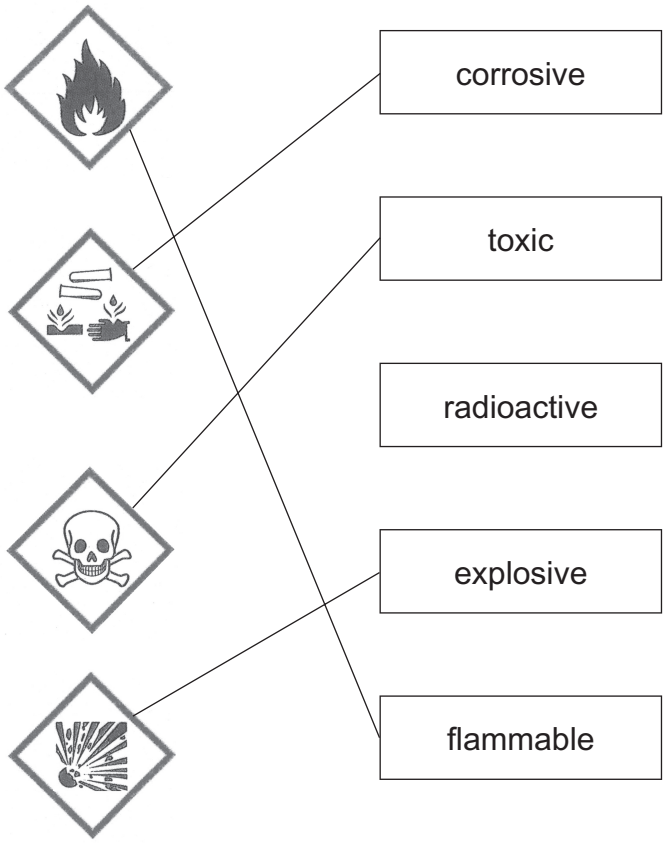
Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

				AVAILABLE MARKS
1	**(a)**		[3]	
	(b)	greater visual impact/internationally understood	[1]	4
2		tectonic [1] seismometer [1] Richter [1]	[3]	3
3	**(a)**	All points plotted correctly [1] smooth curve [1]	[2]	
	(b)	16	[1]	
	(c)	use limewater [1] turns milky/cloudy [1]	[2]	5
4	**(a)**	inner core	[1]	
	(b)	inner core	[1]	
	(c)	crust	[1]	3

					AVAILABLE MARKS
5	**(a)**	**(i)**	B/Beryllium	[1]	
		(ii)	D/Argon	[1]	
		(iii)	E/Francium	[1]	
	(b)		correctly positioned "X" in group VII	[1]	
	(c)	**(i)**	alkali metals	[1]	
		(ii)	NaCl	[1]	
		(iii)	Mendeleev	[1]	7
6	**(a)**		it is a mixture [1] (hundreds) of different chemicals/compounds/hydrocarbons/ substances [1]	[2]	
	(b)	**(i)**	fractional [1] distillation [1]	[2]	
		(ii)	250/10 [1] = 25 [1]	[2]	
		(iii)	less barrels needed [1] more diesel from each barrel [1]	[2]	
	(c)		carbon dioxide [1] water [1]	[2]	10
7	**(a)**		It is not flexible/it shatters easily (cheaper mark wrong)	[1]	
	(b)		Plastic B is cheaper/more flexible/high resistance	[1]	
	(c)		Plastic D (essential) [1] Any ***two*** ● Because it is resistant to alkali [1] ● It is not easily shattered/not flexible [1] ● Melting point is quite high [1] incorrect plastic but correct property/s gains [1] or [2]	[3]	5

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		AVAILABLE MARKS
8	**(a)** *proton* 1 [1] *electron* −1 [1] *neutron* in the nucleus [1] [3]	
	(b) **(i)** 11 [1]	
	(ii) 12 [1]	
	(iii) 2.8.1 [1]	6

9 **Indicative Content**

Safety: (max 2).

- use a small piece of potassium
- handle with tongs
- use a large amount/trough of water
- use a safety screen/goggles

Observations: (max 2).

- Lilac Flame
- Potassium floats/stays on surface
- Potassium moves
- Fizzing/bubbles/gas given off
- Potassium dissolves/gets smaller/forms a ball/melts

Products

- Potassium Hydroxide
- Hydrogen correct word equation

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the demonstration using **5 or 6** of the above points. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
B	Candidates must use appropriate specialist terms throughout to describe the demonstration, using **3–4** of the above points. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates describe the demonstration using only **1 or 2** of the above points. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1–2]
D	Response not worthy of credit.	[0]

6

				AVAILABLE MARKS
10	**(a)**	**(i)** Yellow	[1]	
		(ii) Red	[1]	
		(iii) Red	[1]	
	(b)	**(i)** Neutralisation	[1]	
		(ii) Universal indicator [1] It is only indicator in the table to change colour at pH7/ have a different colour at pH7 [1]	[2]	
	(c)	pH sensor/data logger	[1]	
	(d)	Add red cabbage to water [1] Boil/grind using mortar and pestle [1] Filter/decant/remove cabbage [1]	[3]	
	(e)	magnesium chloride	[1]	11
			Total	**60**

Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2012–2013

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

GSS21

TUESDAY 26 FEBRUARY 2013, MORNING

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 nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in question **8**.
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 included for your use.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

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Examiner Only	
Marks	Remark

1 Some chemicals in the school laboratory have symbols on their labels to warn of danger.

(a) What name is given to these symbols?

Circle the correct answer.

harmful **hazard** **safety** **universal** [1]

(b) Below are three symbols and some descriptions of the dangers. Using lines match each symbol to **one** description of a danger it may cause.

Symbol	Danger
	Could blow up
	Could poison you
	Can cause cancer
	Can damage your skin

© iStockphoto/Hemera/Thinkstock

[3]

(c) Tick (✓) **two** boxes below which explain why symbols are better than words.

They can be understood in many countries ☐

They are more eye catching ☐

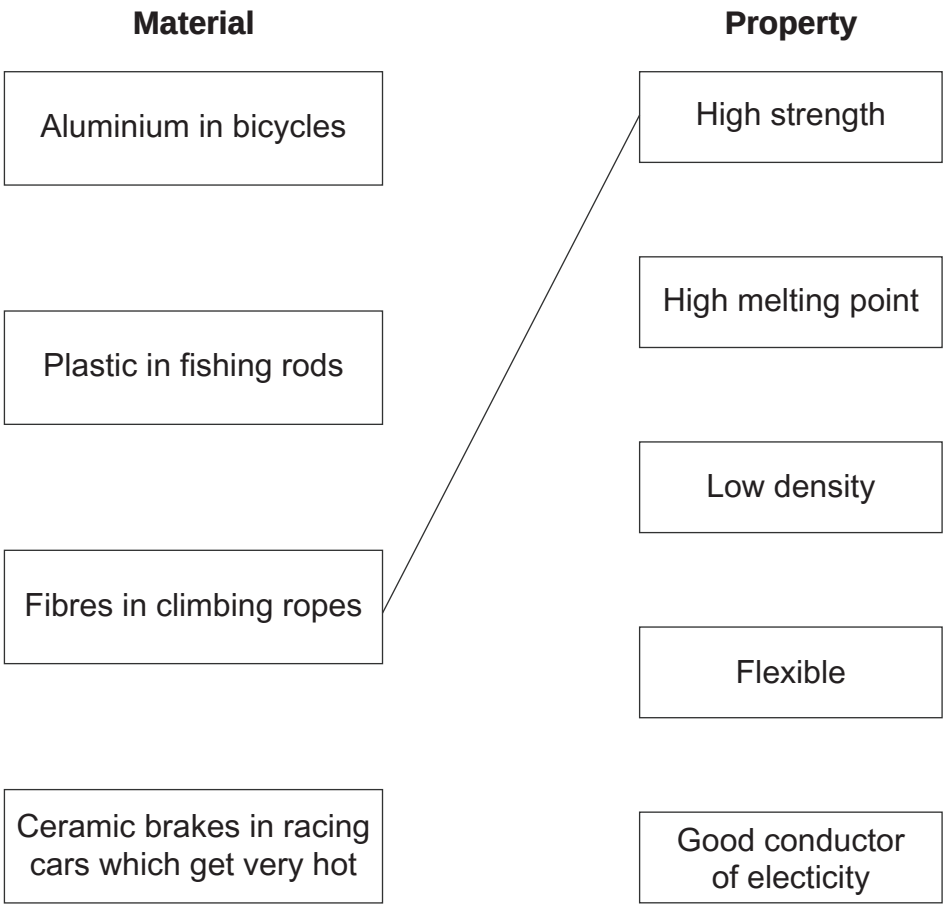
They take up less space ☐

They tell you more information ☐ [2]

Examiner Only	
Marks	Remark

2 **(a)** The list below shows materials used in some types of sports equipment.

Using lines, match each material to **one** property that makes it suitable for that use. One has been done for you.



[3]

(b) Some golf clubs are made from carbon fibre reinforced plastic. This material combines the properties of carbon fibre and plastic.

What name is given to this type of material?

Choose from:

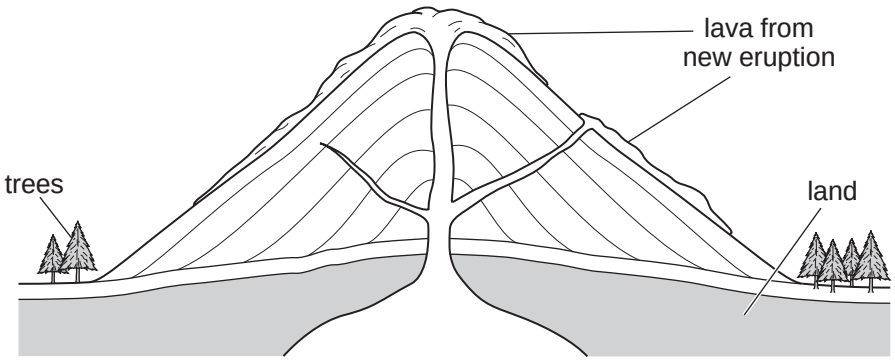
composite **synthetic** **modern**

_____ [1]

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Examiner Only	
Marks	Remark

3 The diagram below shows a cross-section through a volcano.

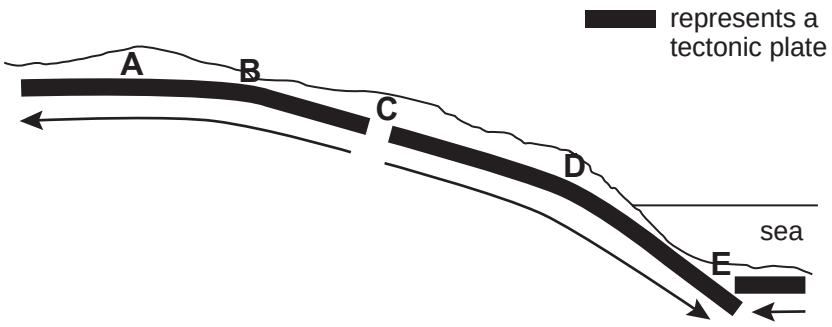


Source: Principal Examiner Phyllis VandeVyver, CCEA

(a) What evidence is there in this diagram to show that the volcano has erupted many times?

_____ [1]

(b) The diagram below represents a section close to the surface of the Earth. The arrows show the direction in which the tectonic plates are moving.



Source: Principal Examiner Phyllis VandeVyver, CCEA

(i) At which point on the diagram **A**, **B**, **C**, **D** or **E** is there most likely to be an earthquake?

_____ [1]

(ii) At which two points on the diagram are there likely to be volcanoes?

Circle the correct answer.

A and **D** **C** and **E** **B** and **D** [1]

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(c) Describe fully what happens during a volcanic eruption including one effect on the environment.

_____

_____

_____

_____ [3]

(d) Name the **type of rock** produced by volcanic activity and give one example.

Type of rock _____

Example _____ [2]

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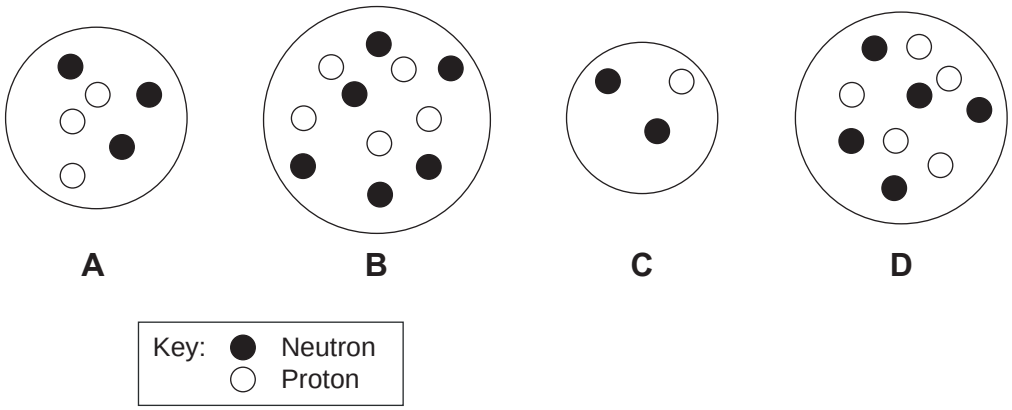
Marks	Remark

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Examiner Only	
Marks	Remark

4 The diagrams below show the nucleus from four different atoms **A**, **B**, **C** and **D**.

(You may find your Data Leaflet useful in answering this question.)



(a) Which atom **A**, **B**, **C** or **D** has an atomic number of three?

_____ [1]

(b) What is the name of element **D**?

_____ [1]

(c) Which two atoms **A**, **B**, **C** or **D** are of the same element?

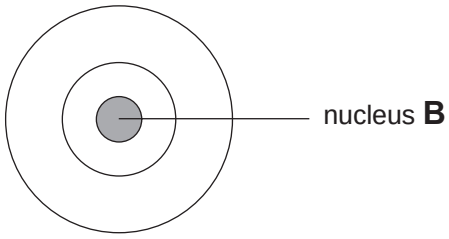
_____ and _____ [1]

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(d) (i) How many electrons does atom **B** have?

_____ [1]

(ii) Complete the diagram below to show the arrangement of these electrons in atom **B**.



[1]

(e) In what Group and Period of the Periodic Table would you find atom **A**?

Group _____

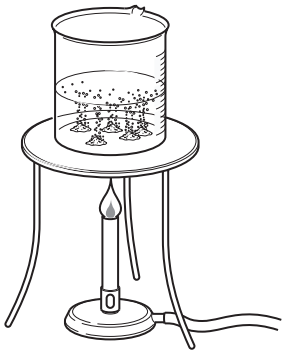
Period _____ [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

5 Red cabbage leaves can be used to make a coloured liquid which changes colour in acids and alkalis.

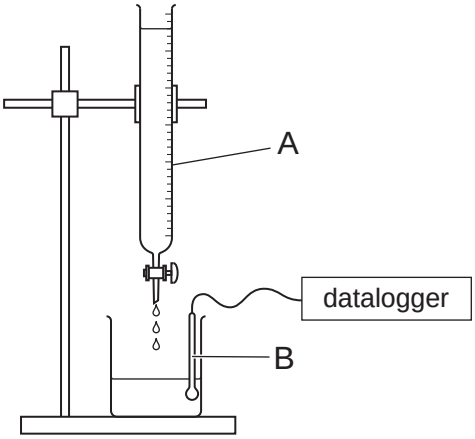


Source: Principal Examiner Phyllis VandeVyver, CCEA

(a) What name is given to a substance which changes colour in acids and alkalis?

_____ [1]

(b) The diagram below shows apparatus used to follow a neutralisation reaction in the laboratory.



Source: Principal Examiner Phyllis VandeVyver, CCEA

Name the pieces of apparatus labelled A and B.

Choose from:

thermometer : measuring cylinder : burette : pipette : pH sensor

A _____

B _____ [2]

Red cabbage dye and red litmus paper change colour as shown in the table below.

Chemical	Colour of red cabbage dye	Colour of red litmus paper	pH range
Hydrochloric acid	red	red	1–2
Sodium hydroxide	yellow	blue	12–14
Water	purple	red	7
Ethanoic acid	red	red	3–6
Sodium hydrogencarbonate	green	blue	8–10

(c) Explain why red litmus paper is not as good as red cabbage dye when testing the pH of chemicals.

_____

_____

_____

_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 **(a)** Below are some natural and synthetic materials.

linen	polyester	wool	nylon
Lycra	cotton	silk	

(i) What is meant by the term natural material?

_____ [1]

(ii) List any **three** of the natural materials given above.

_____ [1]

The picture below shows a cyclist wearing a modern cycling suit.



© iStockphoto / Thinkstock

The following table gives some information about materials that could be used to make the cycling suit.

Material	**Effect of washing**	**Can stretch**	**Effect of sunlight**	**Effect of sweat**
cotton	can shrink	no	colour fades	stains
Lycra	does not shrink	yes	colour does not fade	does not stain
linen	shrinks	no	colour fades	stains
polyester	does not shrink	no	colour does not fade	does not stain

(b) Use this information to decide on the best material to make a modern cycling suit. Explain your answer.

_____

_____

_____

_____

_____ [3]

(c) In Northern Ireland many people used to be employed in the linen industry.

Explain why the numbers employed have fallen.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

7 The photograph below shows the Marble Arch Caves in County Fermanagh. The water in this area is described as being hard.



© Northern Ireland Tourist Board

(a) What is meant by the term **hard water**?

_____

_____ [2]

The table below gives the results of an experiment to test the hardness of different water samples.

Water sample	Volume of soap solution needed to form a lather before boiling/cm^3	Volume of soap solution needed to form a lather after boiling/cm^3
A	20	15
B	4	3
C	14	2
D	24	11

(b) Use this information to answer the following questions.

(i) Which sample **A**, **B**, **C** or **D** of water is the least hard?

_____ [1]

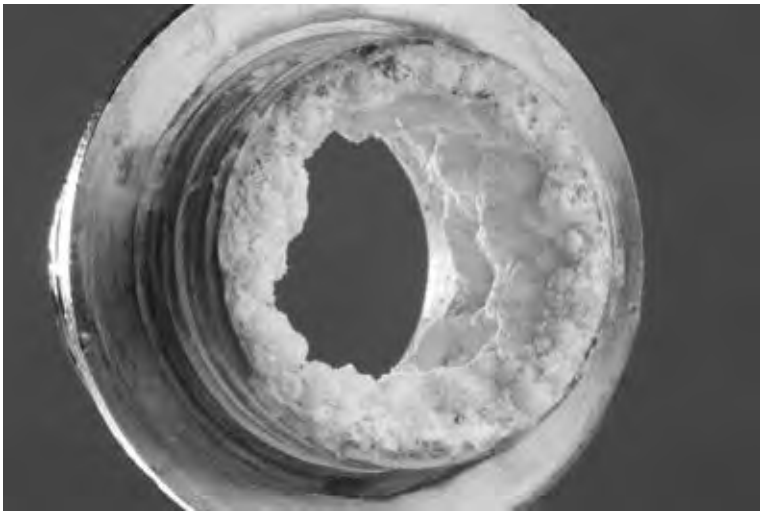
(ii) Which sample **A**, **B**, **C** or **D** contains only temporary hardness?

_____ [1]

(iii) Which **two** samples **A**, **B**, **C** or **D** contain both temporary and permanent hardness?

_____ and _____ [1]

(c) Hard water can cause unwanted deposits in hot water pipes.



© Martyn F Chillmaid / Science Photo Library

Complete the word equation for the reaction that forms the unwanted deposits.

calcium hydrogencarbonate → _____ + _____ + _____

[3]

Examiner Only	
Marks	Remark

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8 Forensic scientists can help to solve crime by taking and analysing fingerprints found at the scene.

Explain fully why fingerprints are so important.

Your answer should include:

- The different types of fingerprints
- How to obtain a fingerprint from different surfaces
- How they are used in the court system

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

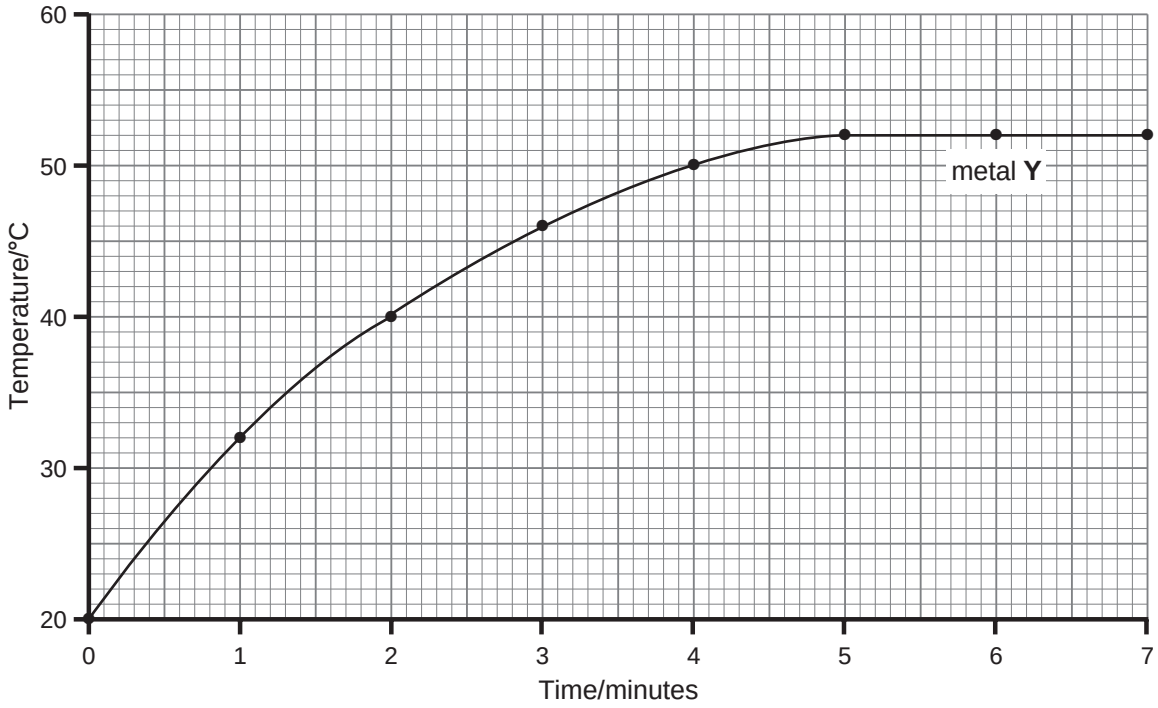
9 Karen carried out an experiment to investigate the reactivity of two metals X and Y. She added 2 grams of metal X to 20 cm^3 of copper sulfate solution (in excess) in a boiling tube. She recorded the temperature of the mixture every minute for seven minutes. She repeated the procedure for metal Y.

The table of results is shown below.

Time/minutes	0	1	2	3	4	5	6	7
Temperature/°C metal X	20	35	44	51	56	58	59	59
Temperature/°C metal Y	20	32	40	46	50	52	52	52

The graph below shows the results for metal **Y**.

(a) On the same grid plot the results for metal **X** and draw a line of best fit.



[3]

(b) (i) Describe the trend shown in the graph for metal **Y**.

_____

_____

_____ [2]

(ii) Describe **one** difference between the results for metals **X** and **Y**.

_____ [1]

(c) (i) Calculate the total increase in temperature for metal **X**.

_____ °C [1]

(ii) What type of chemical reaction caused this increase in temperature?

Choose from:

combustion **displacement** **neutralisation**

_____ [1]

(iii) Using the information from the graph and your knowledge suggest an order of reactivity of the metals, **copper**, **X** and **Y**.

_____ _____ _____ [2]

most reactive least reactive

Examiner Only

Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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113849

Rewarding Learning

General Certificate of Secondary Education
2012–2013

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

TUESDAY 26 FEBRUARY 2013
9.30 am–10.30 am

MARK SCHEME

STEMUP.CO.UK

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

				AVAILABLE MARKS
1	**(a)**	hazard	[1]	
	(b)	toxic – could poison you corrosive – will damage your skin explosive – could blow up	[3]	
	(c)	top two boxes ticked [2] one box correct [1]	[2]	6
2	**(a)**	aluminium – low density plastic – flexible ceramics – high melting point	[3]	
	(b)	composite	[1]	4
3	**(a)**	there are many/7 layers	[1]	
	(b)	**(i)** E	[1]	
		(ii) C and E	[1]	
	(c)	magma pushes up [1] comes down the sides as lava [1] destroys buildings/life/smoke pollution [1]	[3]	
	(d)	igneous [1] granite/basalt [1]	[2]	8
4	**(a)**	A	[1]	
	(b)	boron	[1]	
	(c)	B and D	[1]	
	(d)	**(i)** 5	[1]	
		(ii) 2, 3 – allow ncm to accept 2, 4 if 6 in (d)(i)	[1]	
	(e)	Group 1 [1] Period 2 [1]	[2]	7

			AVAILABLE MARKS
5	**(a)**	indicator [1]	
	(b)	A – burette [1] B – pH sensor [1] [2]	
	(c)	it only has two colours [1] red cabbage shows a range of colours [1] [2]	5
6	**(a)**	**(i)** made from living things [1]	
		(ii) linen/wool/cotton/silk (any 3) [1]	
	(b)	Lycra [1] plus any two: fits tightly reducing air resistance/drag [1] does not shrink [1] is not affected by sweat [1] keeps its colour [1] (max 2 if polyester is chosen) [3]	
	(c)	linen not used so much today/ other materials available (any suitable)/made more cheaply elsewhere [1]	6
7	**(a)**	water which does not lather easily [1] with soap [1] [2]	
	(b)	**(i)** B [1]	
		(ii) C [1]	
		(iii) A and D [1]	
	(c)	calcium carbonate + water + carbon dioxide [3] [1] [1] [1]	8

8 Indicative content

- Arch, loop, whorl and composite (any two)
- Carbon powder/aluminium powder/white powder/powder
- Dusting off with brush
- Use of sellotape/clear tape/transfer to card
- Compare to database
- Unique

Band	Response	Mark
A	Candidates use 5 or 6 of the points given in the indicative content to explain, using appropriate specialist terms, and in a logical sequence, the method used to take fingerprints from different types of surfaces. They use good spelling, punctuation and grammar and the form and style are of a high standard.	5–6
B	Candidates use 3 or 4 of the points given in the indicative content to explain, using appropriate specialist terms, and in a logical sequence, the method used to take fingerprints from different types of surfaces. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	3–4
C	Candidates use 1 or 2 of the points given in the indicative content to explain how fingerprints are taken. They use limited spelling, punctuation and grammar and they make little use of specialist terms. The form and style are of a limited standard.	1–2
D	Response not worthy of credit.	0

AVAILABLE MARKS

6

9 (a) all 8 points correctly plotted [2]
6 or 7 points correctly plotted [1]
line through points [1] [3]

(b) (i) Y increase with temperature with time [1]
levels off [1] [2]

(ii) Metal X increases more sharply or produces a greater temperature rise [1] [1]

(c) (i) 39 [1]

(ii) displacement [1]

(iii) X Y copper [2]

10

Total **60**

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New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012–2013

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

GSS21

TUESDAY 13 NOVEMBER 2012, MORNING

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 ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
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 your use.
Quality of written communication will be assessed in question **10**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** Below are four common materials.

nylon : silk : cotton : polythene

Place each material in the correct column of the table below.

Natural	Synthetic

[2]

Most modern watering cans are made from plastic rather than metal.



© iStockphoto / Thinkstock

(b) Give **one** reason why plastic is a better material for making watering cans.

_____

_____ [1]

Examiner Only	
Marks	Remark

2 **(a)** Below are two types of rock and some named examples.

Using lines, match each type of rock with **one** example.

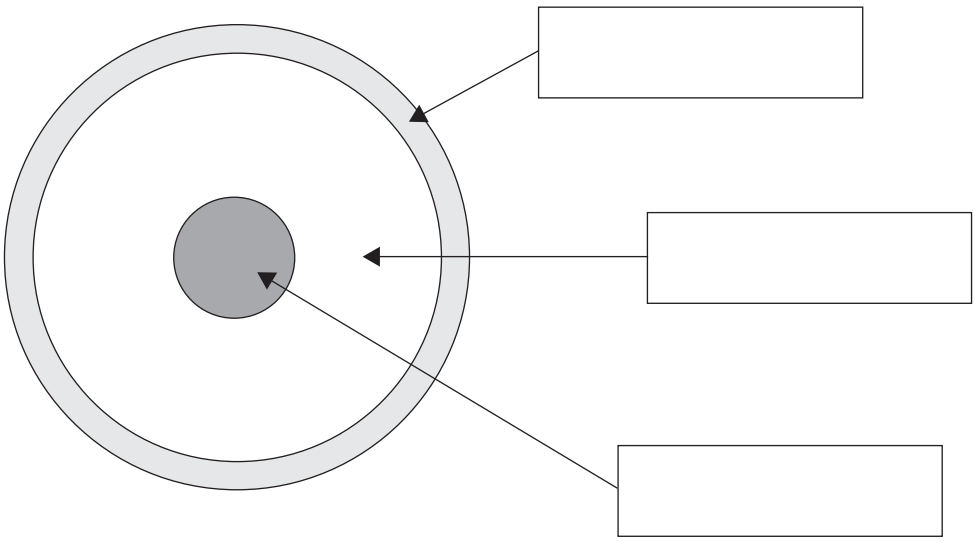
Type of rock	**Example**
Sedimentary	Limestone
Igneous	Granite
	Marble

[2]

(b) Label the structure of the Earth shown below.

Choose from:

volcano : crust : core : skin : mantle



[3]

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Examiner Only	
Marks	Remark

3 The table below gives some information about acids and alkalis.

(a) Complete the table.

Choose from:

strong acid : red : strong alkali : yellow

Solution	pH	Colour with Universal Indicator	Type of solution
Milk of Magnesia	8	blue	weak alkali
oven cleaner	13	purple	
lemon juice	5		weak acid

[2]

(b) Complete the following sentence.

A solution with a pH value of 7 is described as _____. [1]

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(c) **(i)** Draw the hazard symbol you would expect to see on a strong acid such as hydrochloric acid.

[1]

(ii) Name the hazard symbol found on a bottle of strong acid.

_____ [1]

(d) Give **one** reason why hazard symbols and not just words are put on boxes of chemicals.

_____

_____ [1]

Examiner Only

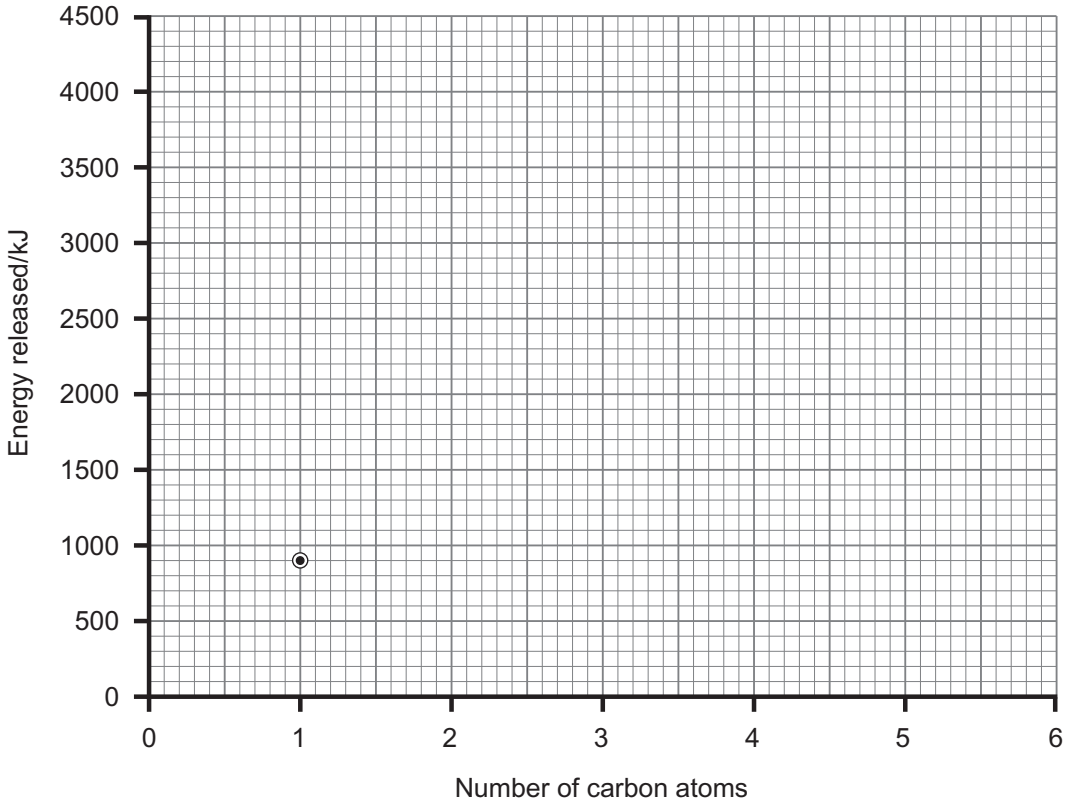
Marks	Remark

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4 In an investigation the same amount of each of five hydrocarbon fuels was burnt. The amount of energy released was measured and recorded below.

Fuel	Number of carbon atoms	Energy released/kJ
Methane	1	900
Ethane	2	1500
Propane	3	2200
Butane	4	2900
Pentane	5	3500

(a) Plot and draw a line graph for these results on the grid below. The first point is plotted for you.



[3]

Examiner Only

Marks	Remark

(b) (i) State **one** thing that was done in this investigation to make it a fair test.

_____ [1]

(ii) Describe the trend shown in these results by completing the following sentence.

As the number of carbon atoms in the fuel increases

_____. [1]

(iii) Use the information given to suggest how much energy would be released if hexane, C_6H_{14}, was burnt.

_____ kJ [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

5 **(a)** Complete the following sentences.

Choose from:

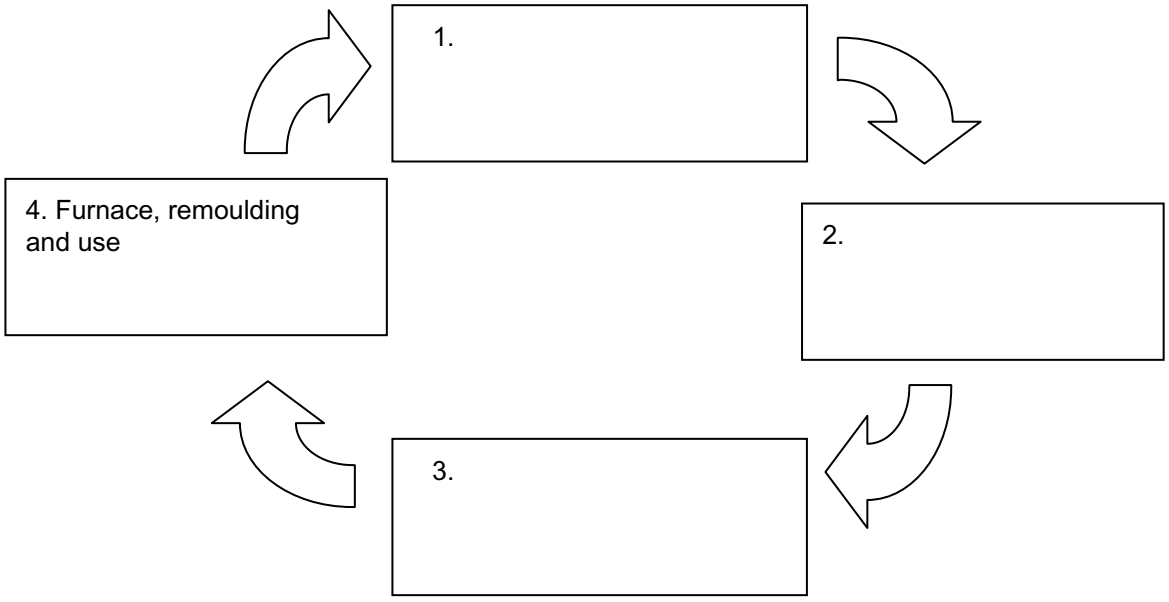
calcium : hydrogen : aluminium : carbon : silver

Hard water is caused by magnesium or _____ compounds.

Nano-sized particles of _____ are used in sterilising sprays.

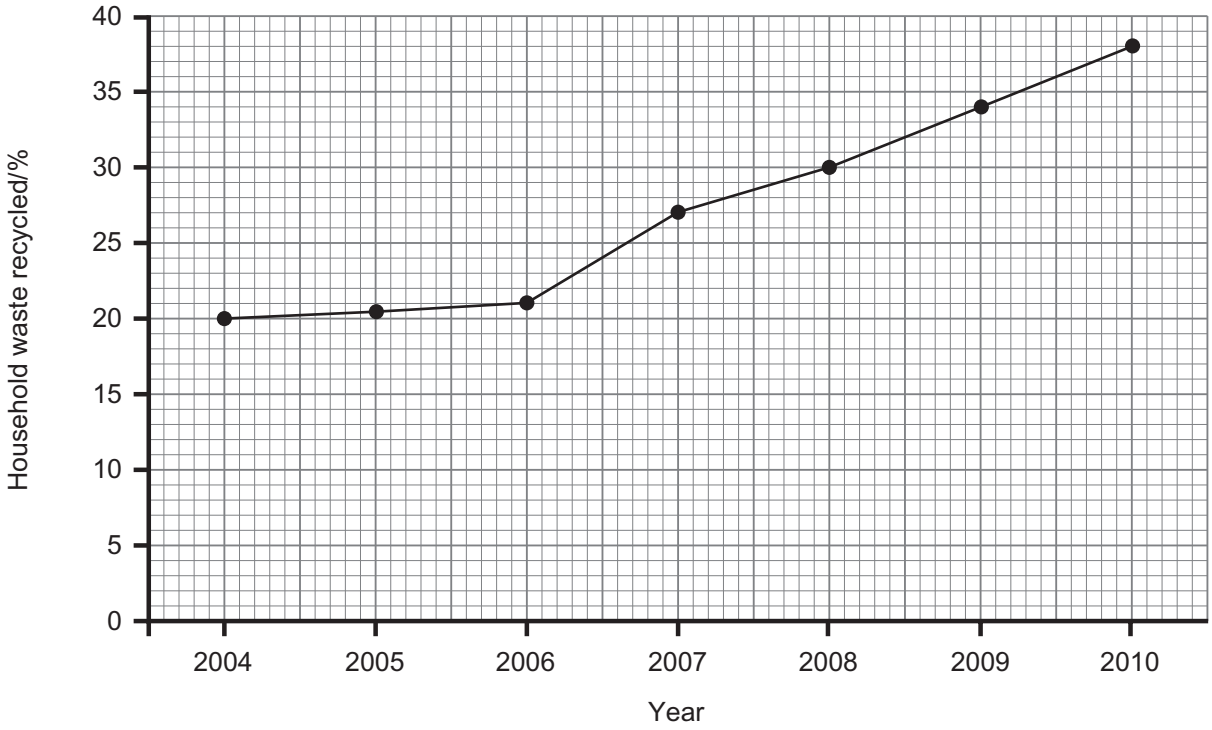
Coal is a fossil fuel that is mainly made of _____. [3]

(b) Complete the following diagram showing the steps in recycling glass.



[3]

6 The graph below shows the percentage of household waste in Northern Ireland that has been recycled over seven years.



Use the graph and your knowledge about recycling to answer the following questions.

Examiner Only	
Marks	Remark

(a) Calculate the increase in the percentage of waste recycled between 2004 and 2010.
(Show your working out.)

_____ % [2]

(b) Suggest the year that local councils first provided recycling bins to households. Explain your answer.

_____

_____

_____ [2]

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Examiner Only	
Marks	Remark

7 Some students compared the reactivity of four metals (cobalt, iron, copper and magnesium) by adding a small amount of each to sulfate solutions of the other metals. If there was a reaction they used a tick (✓), for no reaction they used (✘).

The results are shown below.

Solution / Metal	Cobalt sulfate	Iron sulfate	Copper sulfate	Magnesium sulfate
Cobalt		✘	✓	✘
Iron	✓		✓	✘
Copper	✘	✘		✘
Magnesium	✓	✓	✓	

(a) Use the information in the table and your knowledge to answer the following questions.

(i) Which metal is the most reactive? _____ [1]

(ii) Which metal is the least reactive? _____ [1]

(iii) Give **two** observations you would make when magnesium is added to copper sulfate solution.

1. _____

_____

2. _____

_____ [2]

(b) Complete the word equation for the reaction of magnesium with iron sulfate.

magnesium + iron sulfate → _____ + _____

[2]

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(c) Elements and compounds can be represented by chemical symbols, but they must be written correctly. Give the correct formula for the compounds copper sulfate and magnesium chloride.

(You may find your Data Leaflet helpful.)

Circle the correct answers.

(i) copper sulfate

$CuSO_4$ **CoSu** **$CuSO_2$** **$CUSO_4$** [1]

(ii) magnesium chloride

MGCl **$Mgcl_2$** **MC** **$MgCl_2$** [1]

Examiner Only	
Marks	Remark

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8 The table below shows some information about the elements that are found in Period 3 of the Periodic Table.

Name of element	Sodium	Magnesium	Aluminium	Silicon	Phosphorus	Sulfur	Chlorine	Argon
Symbol	Na	Mg	Al	Si	P	S	Cl	Ar
Atomic number	11	12	13	14	15	16	17	18
Melting point/°C	98	639	660	1410	44	113	–101	–189
Boiling point/°C	883	1090	2467	2680	280	445	–35	–186
Metallic character	Metal	Metal	Metal	Semi-metal	Non-metal	Non-metal	Non-metal	Non-metal

Use this information and your knowledge to answer the following questions.

Examiner Only	
Marks	Remark

(a) Name the **metal** which has the highest melting point.

_____ [1]

(b) Describe the trend in the metallic character across Period 3.

_____

_____ [1]

(c) Name an element from the table that is a **gas** at room temperature (25 °C).

_____ [1]

(d) Name the element which is an **alkali metal**.

_____ [1]

(e) What is the electronic configuration of the **semi-metal**?

Circle the correct answer.

2.8.4 : **2.4.8** : **2.8.6** [1]

(f) Sodium reacts with chlorine to form the compound sodium chloride.
What is the formula for **sodium chloride**?

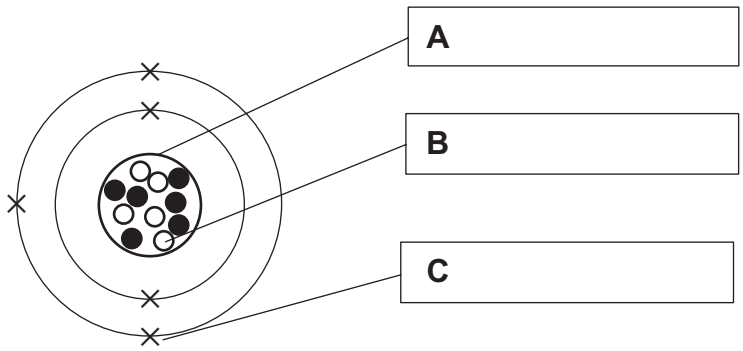
_____ [1]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

9 The diagram shows an atom of boron.



(a) Name the parts labelled **A**, **B** and **C** on the diagram above. [3]

(b) A fluorine atom has nine electrons.

In the space below draw a diagram to show how all the electrons are arranged in an atom of fluorine.

[2]

(c) What is meant by the term **atomic number**?

_____

_____ [1]

(d) The table below contains information about the structure of four elements **W**, **X**, **Y** and **Z**.

Element	Number of protons	Number of neutrons	Number of electrons
W	2	2	2
X	11	12	11
Y	20	20	20
Z	8	8	8

(You may find your Data Leaflet helpful.)

(i) Calculate the mass number of element **Y**.

_____ [1]

(ii) Name the element **X**.

_____ [1]

(iii) Which element (**W**, **X**, **Y**, **Z**) has six electrons in its outer shell?

_____ [1]

(iv) Which element (**W**, **X**, **Y**, **Z**) is a noble gas?

_____ [1]

Examiner Only

Marks	Remark

10 Flame tests can be used to identify the metal in a compound.

Explain how you would carry out a flame test experiment on solutions of potassium chloride and sodium chloride.

Your answer should include:

- any safety precautions
- the results you would expect to see

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark

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New Specification

Rewarding Learning

General Certificate of Secondary Education
2012–2013

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

TUESDAY 13 NOVEMBER 2012
9.15 am–10.15 am

MARK SCHEME

STEMUP.CO.UK

AVAILABLE MARKS

1 (a)

Natural	Synthetic
Silk	**Nylon**
Cotton	**Polythene**

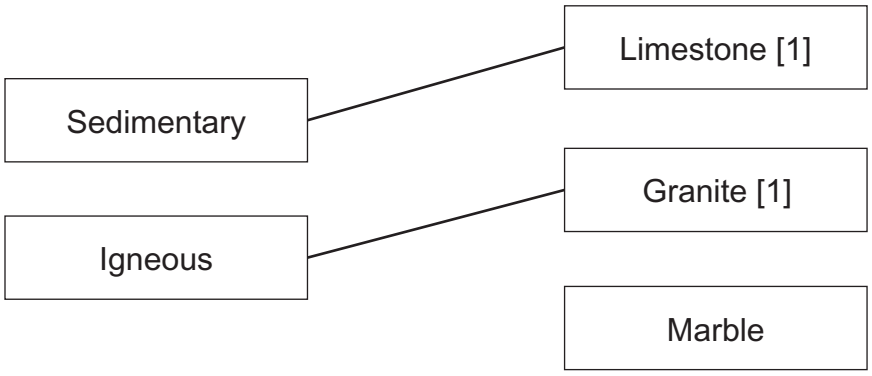
Half mark for each correct answer, rounding down. Total [2]

(b) Any **one** of:

- Plastic is lighter
- Plastic does not rust
- Plastic lasts longer
- Plastic is cheaper
- Other suitable response. (Accept reverse for metal, e.g. metal is heavier)
- Easier to mould [1]

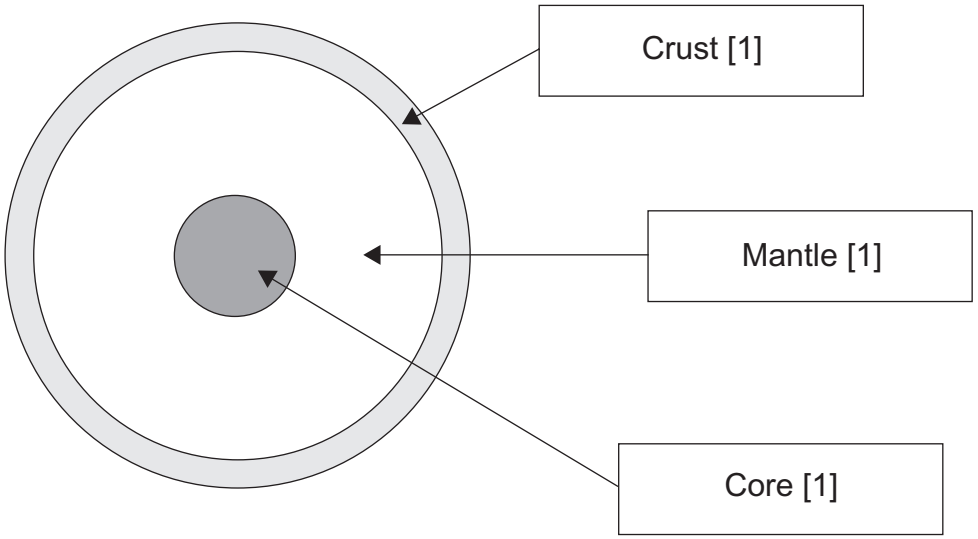
3

2 (a)



[2]

(b)



[3]

5

					AVAILABLE MARKS
3	**(a)**				

Solution	pH	Colour with universal indicator	Type of solution
Milk of magnesia	8	Blue	Weak alkali
Oven cleaner	13	Purple	**Strong Alkali [1]**
Lemon juice	5	**Yellow [1]**	Weak acid

Total [2]

(b) Neutral [1]

(c) **(i)**

'Corrosion symbol' Correct diagram [1]

(ii) Corrosive [1]

(d) Any **one** of:
- Easier to see/Greater visual impact
- Internationally understood
- Easier to understand than words
- Can't read

[1] 6

4 **(a)** 4 points correct [2]
(2/3 points correct [1])
Line of best fit not to 0,0 [1]

(b) **(i)** same amount of fuel. [1]

(ii) the amount of energy released increases. [1]

(iii) 4100–4200 kJ [1] 6

5 **(a)** Calcium, Silver, Carbon [3]

(b) 1. Door step and bottle bank collection/deposit [1]
2. Transport to recycling plant [1]
3. Reprocessing of Cullet/crushing of glass/making cullet [1] 6

6 **(a)** 38–20% [1]
18% [1] (correct answer gets full marks)
if one value from graph is correct and correct subtraction [1] [2]

(b) Year: 2006 [1]
Reason: A larger increase in recycling is seen/larger increase in graph [1] 4

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				AVAILABLE MARKS
7	(a)	(i) Magnesium	[1]	
		(ii) Copper	[1]	
		(iii) Any **two** of: ● Fast/vigorous reaction ● Magnesium dissolves/disappears ● Heat given out/exothermic/temperature rise/gets warmer ● Blue colour of copper sulfate disappears/fades/solution becomes colourless ● Brown/Pink solid/copper metal forms ● Other suitable	Total [2]	
	(b)	Iron [1] + Magnesium sulfate [1] either order	Total [2]	
	(c)	(i) $CuSO_4$	[1]	
		(ii) $MgCl_2$	[1]	8
8	(a)	Aluminium	[1]	
	(b)	Metallic character decreases across the period/changes from metal to non-metal.	[1]	
	(c)	Chlorine/Argon.	[1]	
	(d)	Sodium	[1]	
	(e)	2.8.4	[1]	
	(f)	NaCl	[1]	6
9	(a)	A: Nucleus B: Proton C: Electron	[1] [1] [1]	
	(b)	2.7 correct number of shells [1] correct electronic arrangement [1]	[2]	
	(c)	The number of protons in an element/atom	[1]	
	(d)	(i) 40	[1]	
		(ii) Sodium	[1]	
		(iii) Z/Oxygen	[1]	
		(iv) W/Helium	[1]	10

10 Indicative Content

AVAILABLE MARKS

Flame Test

- Use a Flame test rod/inoculating loop
- Clean the rod by dipping into (concentrated) acid or heating in Bunsen Flame
- Dip the rod into the metal solution and place into Bunsen Flame, (record the colour change)/spray the solution into flame
- Clean the rod and repeat for next solution
- Safety: use goggles and take care with Bunsen Flame

Results

- Sodium – Orange/Yellow Flame
- Potassium – Lilac Flame

Band	Response	Mark
A	Candidates must use appropriate specialist terms throughout to describe the experiment, in a logical sequence and using **6 or 7** of the above Flame test points and must also include a result. They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5–6]
B	Candidates must use some appropriate specialist terms throughout to describe the procedure, using **3 to 5** of the above points. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3–4]
C	Candidates describe the procedure using only **1 or 2** of the above points however these are not presented in a logical sequence. They use limited spelling, punctuation and grammar and they have made little use of specialist terms.	[1–2]
D	Response not worthy of credit.	[0]

6

Total **60**

New Specification

Rewarding Learning

General Certificate of Secondary Education
2012–2013

Science: Single Award

Unit 2 (Chemistry)

Foundation Tier

[GSS21]

TUESDAY 28 FEBRUARY 2012
11.00 am–12.00 noon

MARK SCHEME

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				AVAILABLE MARKS
1	**(a)**	low density [1] strong [1] hard [1]	[3]	
	(b)	it's a conductor (of electricity)/could get an electric shock [1]	[1]	
	(c)	wood/plastic Accept – Steel/Iron	[1]	5
2	**(a)**	vinegar – ethanoic acid baking soda – sodium hydrogencarbonate Milk of magnesia – magnesium hydroxide	[3]	
	(b)	**(i)** flammable	[1]	
		(ii) greater visual impact [1]/internationally understood [1]	[2]	6
3	**(a)**	(citric) acid	[1]	
	(b)	universal (indicator) Accept – pH paper	[1]	
	(c)	more accurate	[1]	
	(d)	alkaline/alkali	[1]	4
4	**(a)**	plastic bottle	[1]	
	(b)	plastic bag, glass bottle, aluminium can, plastic bottle takes too long to decay/do not rot saves resources/saves energy/saves landfill	[1] [1] [1]	
	(c)	**(i)** can rot/decay/be broken down [1] by microbes/bacteria/fungi [1]	[2]	
		(ii) newspaper	[1]	
	(d)	gives off polluting gas/methane [1]; leaks to water supplies/foul smelling liquid [1]	[2]	
	(e)	**(i)** 100 − 85 [1] = 15% [1]	[2]	
		(ii) fines/reward/provide recycling bins/Education/Advertising/ Posters *any 2*	[2]	13
5	**(a)**	A = electron [1]/B = neutron [1]	[2]	2

					AVAILABLE MARKS
6	**(a)**	whorl	[1]		
	(b)	aluminium/white powder	[1]		
	(c)	sprinkle powder over fingerprint [1] remove excess powder [1] place sticky tape over fingerprint [1] lift off sticky tape (and place on piece of card) [1]	*any 3*	[3]	5
7	**(a)**	**(i)** 3		[1]	
		(ii) lithium		[1]	
	(b)	**(i)** 37.5 $\pm$ 0.5		[1]	
		(ii) rubidium		[1]	
	(c)	one/alkali metal		[1]	
	(d)	as the atomic number increases, the melting point decreases/ converse reference to change in slope as atomic number increases		[1] [1]	
	(e)	**(i)** fluorine		[1]	
		(ii) bromine		[1]	
		(iii) increase, increase *or* decrease, decrease		[1]	10

8 **(a)** **(i)** 18 + 113 [1] = 131 [1] [2]

(ii) hydrogencarbonate [1]

(b) calcium hydrogencarbonate ⟶ carbon dioxide + water [3]

(c) forms scum/does not lather [1] with soap [1] [2]

(d) **Indicative content**

- Take a given volume of bottled water/(req. value)
- Add soap solution (to get a permanent lather)
- Record volume of soap solution
- Repeat procedure for tap water
- Water which requires most soap is hardest
- A correctly named piece of apparatus
- A controlled variable

Band	Response	Mark
A	Using 5–7 of the points shown in the indicative content, candidates describe fully an experiment to test the hardness of two water samples and compare them, in a logical sequence. They use good spelling, punctuation and grammar and the form and style are of a good high standard.	5–6
B	Using 3–4 of the points shown in the indicative content candidates describe fully an experiment to test the hardness of two water samples and compare them, in a logical sequence. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	3–4
C	Candidates make reference to 1–2 of the points shown in the indicative content using limited spelling, punctuation and grammar. The form and style is of limited standard and they have made little use of the specialist terms.	1–2
D	Response not worthy of credit.	0

[6]

(e) better taste/stronger teeth and bones/reduce risk of heart disease [1]

Total

AVAILABLE MARKS

15

60