EDEXCEL GCSE CHEMISTRY

CHEMISTRY



EXAM QUESTION PACK

UNIT C1 FOUNDATION TIER 5CH1F PAPERS

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Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | Candidate Number

Chemistry/Science

Unit C1: Chemistry in Our World

Foundation Tier

Thursday 18 January 2018 – Morning
Time: 1 hour

Paper Reference
5CH1F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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The Periodic Table of the Elements

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	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

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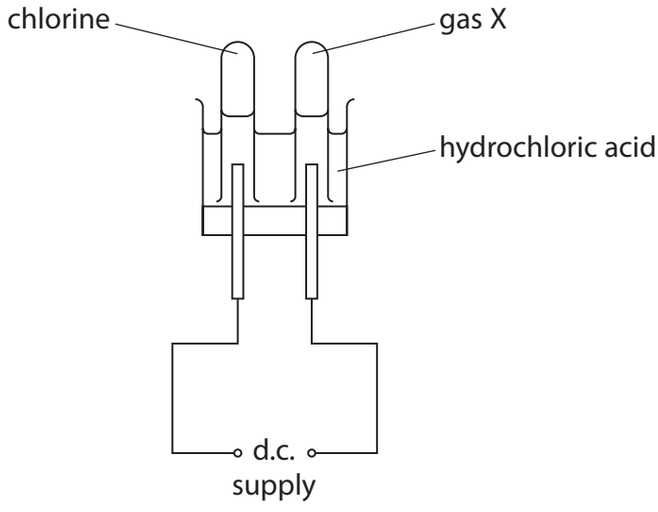
Questions begin on next page.

Answer ALL questions

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Hydrochloric acid

1 (a) Dilute hydrochloric acid can be decomposed by passing a direct electric current through it using the apparatus shown in the diagram.



(i) Give the name of the process in which a substance is decomposed by a direct electric current.

(1)

.....

(ii) The experiment is carried out in a fume cupboard because chlorine gas is formed.

Explain why a fume cupboard is used.

(2)

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(iii) Gas **X** is tested.
A burning splint is applied to a mixture of gas **X** and air in a test tube.
A squeaky pop is heard as the gas burns.

Give the name of gas **X**.

(1)

.....

(b) Hydrochloric acid is produced in the stomach.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Hydrochloric acid in the stomach helps to break down food.
Hydrochloric acid in the stomach also

(1)

☒ **A** improves the flavour of the food

☒ **B** kills bacteria

☒ **C** neutralises acid

☒ **D** releases energy

(ii) Acid indigestion is caused by excess hydrochloric acid in the stomach.

Which of these could help to cure acid indigestion safely?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** sodium chloride

☒ **B** sodium hydroxide

☒ **C** calcium carbonate

☒ **D** calcium chloride

(c) Hydrochloric acid reacts with metal oxides to form a salt and water.

Complete the word equation for the reaction of magnesium oxide with hydrochloric acid.

(2)

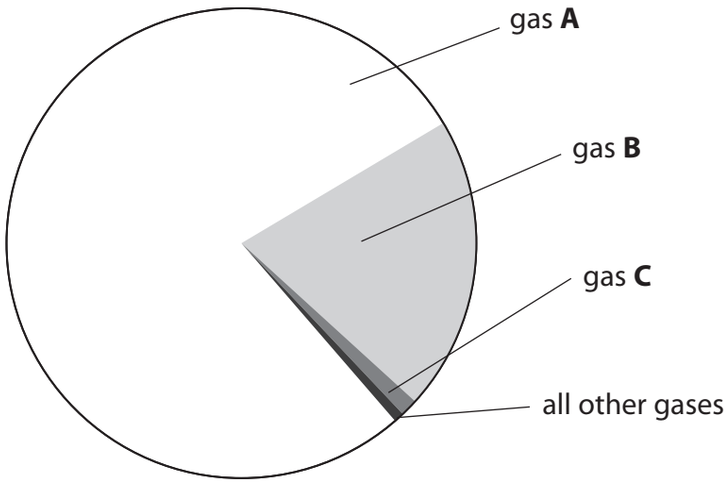
magnesium oxide + hydrochloric acid → .....

(Total for Question 1 = 8 marks)

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The atmosphere

2 (a) The pie chart shows the percentages by volume of gases in dry air.



(i) State the name of gas **A**.

(1)

.....

(ii) Gas **B** is released by photosynthesis.

State the name of gas **B** and state the percentage of gas **B** in dry air.

(2)

name .....

percentage = ...

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Gas **C** is

(1)

☒ **A** ammonia

☒ **B** argon

☒ **C** carbon dioxide

☒ **D** water vapour

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(iv) Gas **A** makes up the largest percentage of dry air.
All the other gases make up 22% of dry air.

Calculate the percentage of gas **A** in dry air.

(1)

.....

percentage of gas **A** = ...

(b) The Earth's early atmosphere contained a large amount of water vapour.

(i) State how this water vapour entered the early atmosphere.

(1)

.....

.....

.....

(ii) Today's atmosphere contains a very different amount of water vapour.

Explain why the amount of water vapour in the atmosphere has changed.

(2)

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(Total for Question 2 = 8 marks)

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Metals

3 Iron and aluminium are metals.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

Most metals are extracted from rocks found in the Earth's crust.

Rocks from which metals can be extracted are called

(1)

☒ **A** elements

☒ **B** igneous

☒ **C** ores

☒ **D** sand

(b) Iron is extracted by heating a mixture of iron oxide and carbon.

Complete the word equation for this reaction.

(2)

iron oxide + ... → iron + ...

(c) Aluminium, rather than iron, is used as the main metal in the production of aeroplanes.

Give **two** reasons why aluminium is used as the main metal in the production of aeroplanes.

(2)

reason 1 .....

.....

reason 2 .....

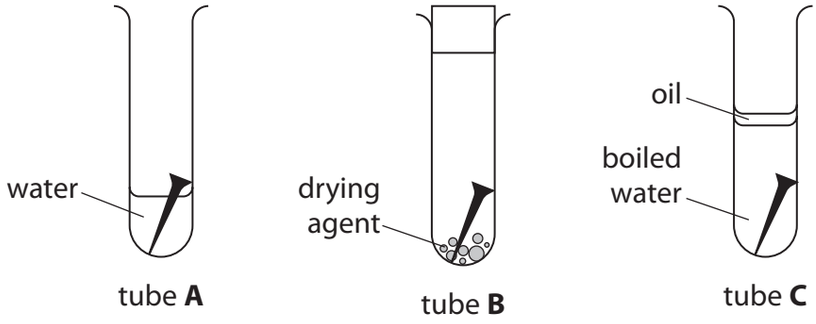
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(d) An experiment was carried out to investigate the conditions needed for iron to rust.

Three test tubes, **A**, **B** and **C**, had identical iron nails placed in them, under different conditions.



The tubes were left for two weeks.
The observations are recorded in the table.

test tube	conditions	observations
A	air and water	rusted
B	dry air	not rusted
C	boiled water containing no air	not rusted

Explain why the iron nail placed in test tube **A** rusted but the iron nails in test tubes **B** and **C** did not rust.

(2)

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(e) Stainless steel is an alloy containing iron and chromium.

(i) State what is meant by an **alloy**.

(2)

.....

.....

(ii) Cutlery is made of stainless steel.

Give a reason why cutlery is not made of pure iron.

(1)

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(Total for Question 3 = 10 marks)

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Plastics

4 (a) Molecules of plastics are long chains of repeating units.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

A substance that contains molecules that are long chains of repeating units is

(1)

☒ **A** an alkene

☒ **B** a biofuel

☒ **C** a polymer

☒ **D** a salt

(ii) Describe how ethene molecules can form molecules that are long chains of repeating units.

(2)

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(b) An experiment was carried out to see if different plastics, **A**, **B** and **C**, were biodegradable.

In the experiment, 100 g of each plastic was buried in identical samples of soil under identical conditions.

After 100 days and 200 days the mass of each plastic remaining was measured.

The results are shown in the table.

	mass remaining / g	
plastic	**after 100 days**	**after 200 days**
A	46	14
B	32	2
C	100	100

(i) Give the meaning of the term **biodegradable**.

(2)

.....

.....

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(ii) Explain, using evidence from the table, which plastic is non-biodegradable.

(2)

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(iii) Give one advantage of disposing of waste plastic by burning.

(1)

.....

.....

.....

(c) Poly(chloroethene) is used as a plastic.
A molecule of poly(chloroethene) can be shown as $(CH_2CHCl)_n$.

Give the names of the **three** elements present in poly(chloroethene).

(1)

.....

(Total for Question 4 = 9 marks)

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Rocks

5 (a) Limestone is a sedimentary rock.
Limestone is a form of calcium carbonate.

(i) A sample of limestone has a layered structure and contains fossils.

Explain how this limestone has formed.

(2)

(ii) When calcium carbonate is heated strongly, it is converted into calcium oxide.

This is a thermal decomposition reaction.

Explain what is meant by **thermal decomposition**.

(2)

(iii) When a given mass of solid calcium carbonate is completely decomposed, the solid calcium oxide formed has a lower mass.

Explain why the mass of calcium oxide at the end of the reaction is less than the original mass of calcium carbonate.

(2)

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*(b) Limestone is an important raw material and has many uses.
Large quantities of limestone are extracted from quarries.

A decision is made to close a limestone quarry.

Describe large scale uses of limestone and discuss the advantages and disadvantages for a local community if the limestone quarry in the area is closed.

(6)

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(Total for Question 5 = 12 marks)

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Fuels

6 Petrol is a fuel used in cars.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

Petrol is obtained from crude oil.
The process used to separate petrol from crude oil is

(1)

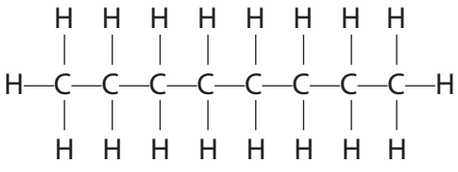
☒ **A** dissolving

☒ **B** electrolysis

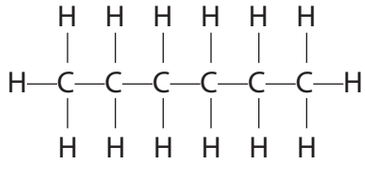
☒ **C** filtration

☒ **D** fractional distillation

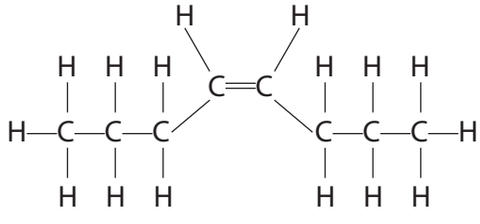
(b) A molecule of each of three substances, **P**, **Q** and **R**, is shown below.



substance **P**



substance **Q**



substance **R**

(i) One of the substances found in petrol is octane, C_8H_{18}.

Explain which of the substances, **P**, **Q** or **R**, is octane.

(2)

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(ii) A small amount of bromine water is shaken with separate samples of **P**, **Q** and **R**.
One mixture changes colour from orange to colourless.
The other two mixtures remain orange.

Explain which two of the mixtures remain orange.

(2)

.....

.....

.....

(iii) Substances **P**, **Q** and **R** are all hydrocarbons.

Explain how the formulae of substances **P**, **Q** and **R** show that they are all hydrocarbons.

(2)

.....

.....

.....

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*(c) Petrol and hydrogen are both fuels that can be burnt in the engines of cars.

Identify the products formed when each of these fuels burns and give the advantages and disadvantages of using hydrogen rather than petrol as a fuel in cars.

(6)

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(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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Pearson

Mark Scheme (Results)

January 2018

Pearson Edexcel GCSE

In Chemistry (5CH1F)

Paper 01

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Acceptable answers	Marks
1 (a)(i)	electrolysis		1

Question number	Answer	Acceptable answers	Marks
1 (a)(ii)	An explanation linking • toxic / poisonous (gas) (1) • fume cupboard removes gas / stated effect of chlorine (1)		2

Question number	Answer	Acceptable answers	Marks
1 (a)(iii)	hydrogen	H_2 Reject H, H^2	1

Question number	Answer	Acceptable answers	Marks
1 (b)(i)	**B** kills bacteria		1

Question number	Answer	Acceptable answers	Marks
1 (b)(ii)	**C** calcium carbonate		1

Question number	Answer	Acceptable answers	Marks
1 (c)	magnesium chloride (1) water (1)	ignore formulae	2

Total for Question 1 = 8 marks

Question number	Answer	Acceptable answers	Marks
2 (a)(i)	nitrogen (1)	N_2 reject N, N^2	1

Question number	Answer	Acceptable answers	Marks
2 (a)(ii)	name: oxygen (1) percentage: allow anything from 20-21 (1)	O_2 reject O, O^2 % ≧ 20 and ≦ 21	2

Question number	Answer	Acceptable answers	Marks
2 (a)(iii)	**B argon**		1

Question number	Answer	Acceptable answers	Marks
2 (a)(iv)	78 (%)		1

Question number	Answer	Acceptable answers	Marks
2 (b)(i)	(released by) volcanoes (1)		1

Question number	Answer	Marks
2 (b)(ii)	An explanation linking any two of the following • Earth cooled (1) • water vapour condensed/ formed rain (1) • amount water vapour in atmosphere reduced (1)	2

Total for Question 2 = 8 marks

Question number	Answer	Acceptable answers	Marks
3 (a)	**C** ores		1

Question number	Answer	Acceptable answers	Marks
3 (b)	• carbon (1) • carbon dioxide/carbon monoxide (1)	ignore formulae	2

Question number	Answer	Acceptable answers	Marks
3 (c)	• aluminium is less dense than iron / aluminium has low density (1) • aluminium does not **corrode** (1)	allow 'light' ignore 'does not rust'	2

Question number	Answer	Acceptable answers	Marks
3 (d)	An explanation linking : • B has no water (1) • A has water and oxygen **and** C has no oxygen (1)	allow air for oxygen	2

Question number	Answer	Acceptable answers	Marks
3 (e)(i)	• mixture (1) • metals (1)	ignore 'compound'	2

Question number	Answer	Acceptable answers	Marks
3 (e)(ii)	Any one from • iron rusts/corrodes/ reacts with air and water/ ORA (1) • iron is soft / bends easily / ORA (1)		1

Total for Question 3 = 10 marks

Question number	Answer	Acceptable answers	Marks
4 (a) (i)	**C** a polymer		1

Question number	Answer	Acceptable answers	Marks
4 (a) (ii)	• double bond breaks (in monomer) (1) • molecules link together (1)		2

Question number	Answer	Acceptable answers	Marks
4 (b)(i)	• breaking down/ decomposing • by biological action/ by bacteria/ by enzymes		2

Question number	Answer	Acceptable answers	Marks
4 (b)(ii)	• C • because no loss in mass/ no change		2

Question number	Answer	Acceptable answers	Marks
4 (b)(iii)	no/little solid waste / releases (heat) energy		1

Question number	Answer	Acceptable answers	Marks
4 (c)	carbon **and** hydrogen **and** chlorine	ignore symbols	1

Total for Question 4 = 9 marks

Question number	Answer	Acceptable answers	Marks
5 (a)(i)	An explanation linking two of the following • build up of sediment (1) • compaction/ squashing/high pressure on layers (1) • long period of time (1) • fossils are caused by skeletons of marine animals / bones/shells (1)		2

Question number	Answer	Acceptable answers	Marks
5 (a)(ii)	An explanation linking the following • breaking down (of a compound) (1) • by heat (energy) (1)		2

Question number	Answer	Acceptable answers	Marks
5(a)(iii)	An explanation linking the following • gas / carbon dioxide / CO_2 formed (1) • (gas) {escapes/is lost/given off/released/ evolved} (1)		2

Question number		Indicative Content	Marks
QWC	***5(b)**	A description to include some of the following points LARGE SCALE USES • making construction materials • making cement • making concrete • making glass • making steel • limestone can be used to neutralise acidic gases from (coal-fired) power station chimneys • {calcium oxide / (quick)lime or calcium hydroxide / slaked lime} can be made from it and used to neutralise acidic soils DISADVANTAGES • loss of jobs • depression of local economy • supply of limestone reduced ADVANTAGES • noise pollution reduced • less dust /smoke • less dust that can cause health problems (asthma/breathing difficulty) • less traffic on roads • use of empty quarry eg water park/ wildlife park etc • may improve tourism • no further damage to natural habitats of birds/animals/plants	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited description of a use or an advantage or a disadvantage • answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• A simple description of a use and an advantage/disadvantage or two advantages/disadvantages • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• A detailed description to include uses, advantages and disadvantages • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Question 5 = 12 marks

Question number	Answer	Marks
6 (a)	**D** fractional distillation	1

Question number	Answer	Acceptable answers	Marks
6 (b)(i)	An explanation linking the following • P (1) • **molecular formula** is C_8H_{18} / has 8 carbon atoms and 18 hydrogen atoms (1)		2

Question number	Answer	Acceptable answers	Marks
6(b)(ii)	An explanation linking the following • P **and** Q (1) • saturated/ no C=C / no double bonds/ alkanes (1)		2

Question number	Answer	Acceptable answers	Marks
6(b)(iii)	An explanation linking the following • molecules containing carbon and hydrogen (atoms) (1) • only (1)		2

Question number		Indicative Content	Marks
QWC	***6(c)**	A description to include some of the following points Advantages of hydrogen • water (only) formed • water is not harmful • no carbon dioxide released on combustion • renewable • hydrogen is obtain from water Disadvantages of hydrogen • hydrogen filling stations not readily available • hydrogen a gas so harder to store • hydrogen must be stored under pressure • hydrogen must be stored in heavy containers • if produced by electrolysis, carbon dioxide may be released in electricity production • expensive to produce by electrolysis Advantages of petrol • petrol readily available • petrol a liquid so easy to store • petrol releases a lot of energy when burned Disadvantages of petrol • carbon dioxide formed • carbon dioxide a greenhouse gas • other harmful products may include- carbon monoxide, nitrogen oxides, sulfur dioxide, unburnt hydrocarbons • non-renewable	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited description of the products of burning one fuel or an advantage or a disadvantage of hydrogen • answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• A simple description of the products of burning of both fuels OR advantages and disadvantages of hydrogen • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• A detailed description to include the products of burning of both fuels and advantages and disadvantages of hydrogen • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Question 6 = 13 marks

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Surname	Other names

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Centre Number | | | | | |

Candidate Number | | | | |

Chemistry/Science

Unit C1: Chemistry in Our World

Foundation Tier

Thursday 18 May 2017 – Morning
Time: 1 hour

Paper Reference
5CH1F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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The Periodic Table of the Elements

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	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

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Questions begin on next page.

Answer ALL questions

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Carbon dioxide

1 One of the gases in today's atmosphere is carbon dioxide.

(a) Carbon dioxide is detected by bubbling it through limewater.
A white precipitate forms in the test tube showing that the gas is carbon dioxide.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

Limewater is a solution of

☒ **A** hydrochloric acid

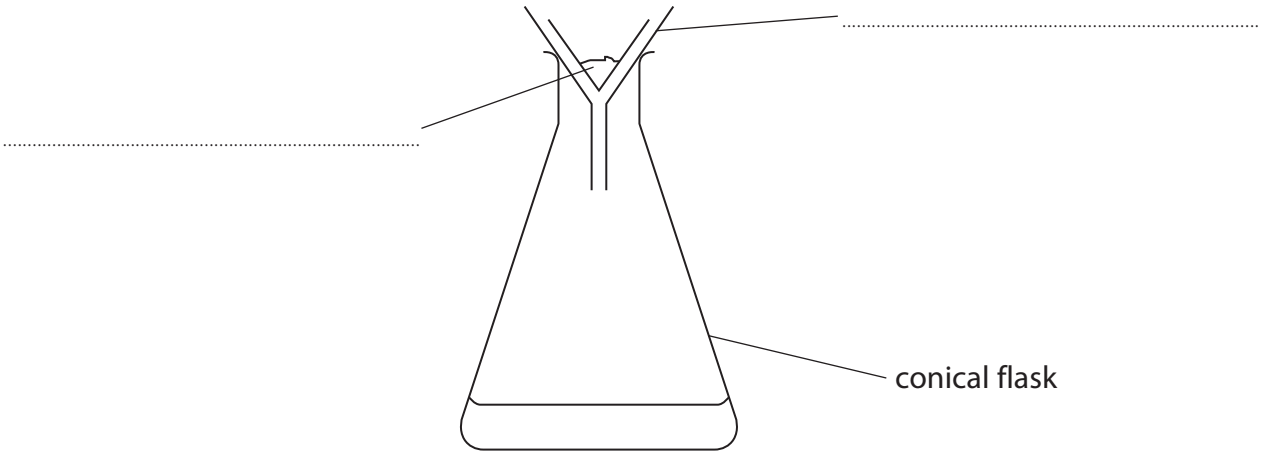
☒ **B** calcium hydroxide

☒ **C** sodium chloride

☒ **D** sodium hydroxide

(ii) The white precipitate formed is filtered off.

The diagram shows the results of the filtration.



Complete the two labels on the diagram.

(2)

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(b) The amount of carbon dioxide in today's atmosphere is different from that in the Earth's early atmosphere.

(i) State a way in which carbon dioxide is removed from the atmosphere.

(1)

.....

.....

(ii) State a way in which carbon dioxide was added to the atmosphere before humans were on the Earth.

(1)

.....

.....

(c) Methane is a hydrocarbon.
When methane burns completely, it reacts with oxygen to form carbon dioxide and one other product.

(i) Write the word equation for this reaction.

(2)

.....

(ii) Which of these is used in the largest amount as a fuel?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** bitumen

☒ **B** diesel oil

☒ **C** hydrogen

☒ **D** oxygen

(Total for Question 1 = 8 marks)

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Metals

2 Metals are found in the Earth's crust.

(a) Unreactive metals are found as uncombined metals.

Which of these metals is usually found uncombined in the Earth's crust?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** gold

☒ **B** iron

☒ **C** potassium

☒ **D** zinc

(b) (i) Lead can be produced by heating lead oxide with carbon.

Complete the word equation for this reaction.

(2)

lead oxide + ... → lead + ...

(ii) In this reaction, lead oxide is reduced.

Complete the sentence.

(1)

Lead oxide has been reduced because it has lost ..... .

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(c) Aluminium is extracted from aluminium oxide by electrolysis.
Heating with carbon is not used to extract aluminium from aluminium oxide.

Explain why aluminium is not extracted by heating with carbon.

(2)

(d) There are many uses of aluminium. These uses are related to its properties.

The table shows information about the properties of aluminium and steel.

metallic substance	density / kg m^{-3}	cost per tonne / £	relative strength	relative ability to conduct electricity	relative resistance to corrosion
aluminium	2700	1000	high	good	good
steel	7820	100	very high	good	poor

Use the information in the table to explain which properties of aluminium make it more suitable than steel for use in overhead power cables.

(2)

(Total for Question 2 = 8 marks)

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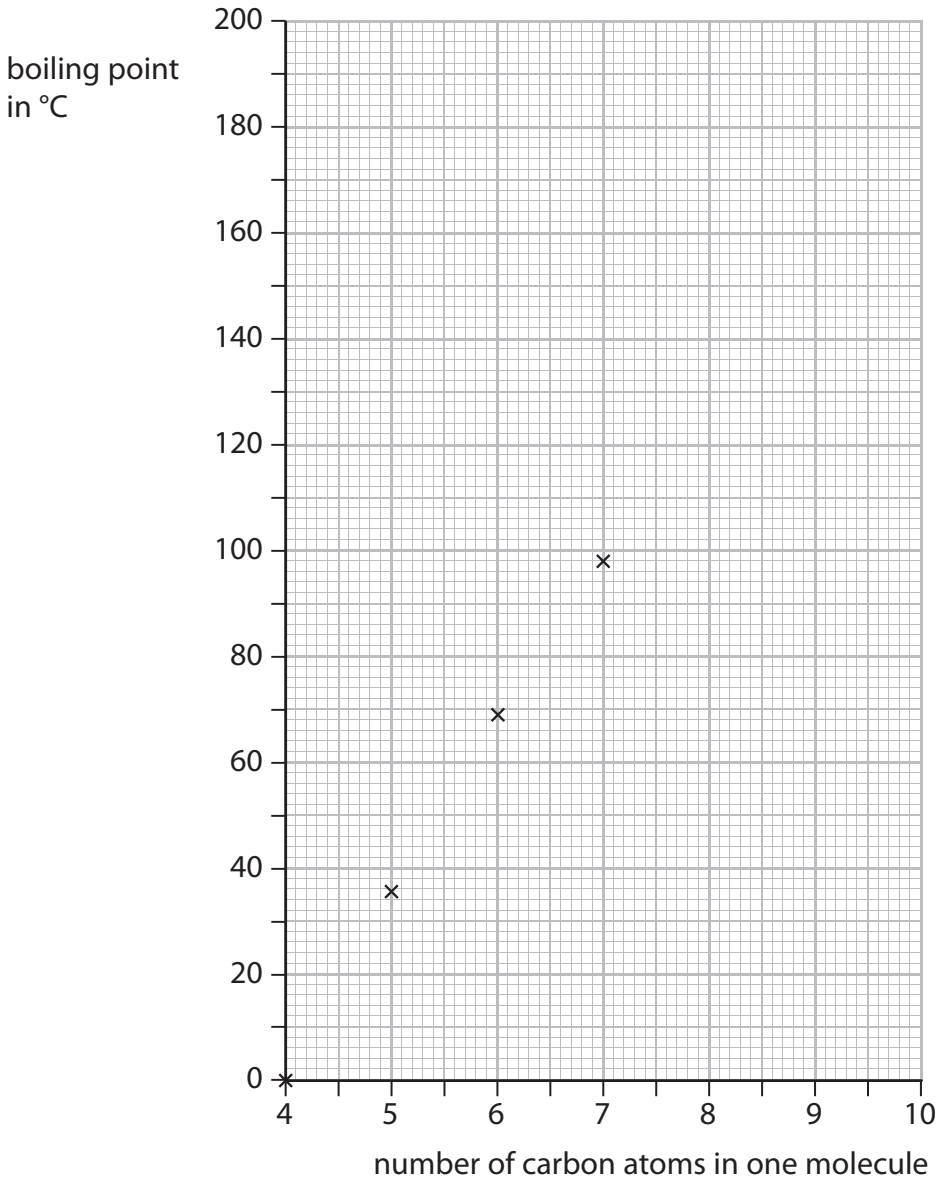
Alkanes

3 (a) The alkanes are hydrocarbons.

The table shows the number of carbon atoms per molecule and the boiling point for some alkanes.

alkane	number of carbon atoms in one molecule	boiling point (°C)
butane	4	0
pentane	5	36
hexane	6	69
heptane	7	98
octane	8	126
nonane	9	151

The boiling points for butane, pentane, hexane and heptane are plotted on the graph.



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(i) Plot the boiling points for octane and nonane and draw the line of best fit.

(2)

(ii) Describe the trend shown by the line of best fit on the graph.

(2)

.....

.....

.....

(iii) Extend the line on your graph to estimate the boiling point of the alkane with ten carbon atoms in one of its molecules.

(2)

boiling point = ...

(iv) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

All alkanes

☒ **A** have molecules containing oxygen atoms

☒ **B** form a colourless mixture when shaken with bromine water

☒ **C** can burn in a limited supply of air to form carbon monoxide

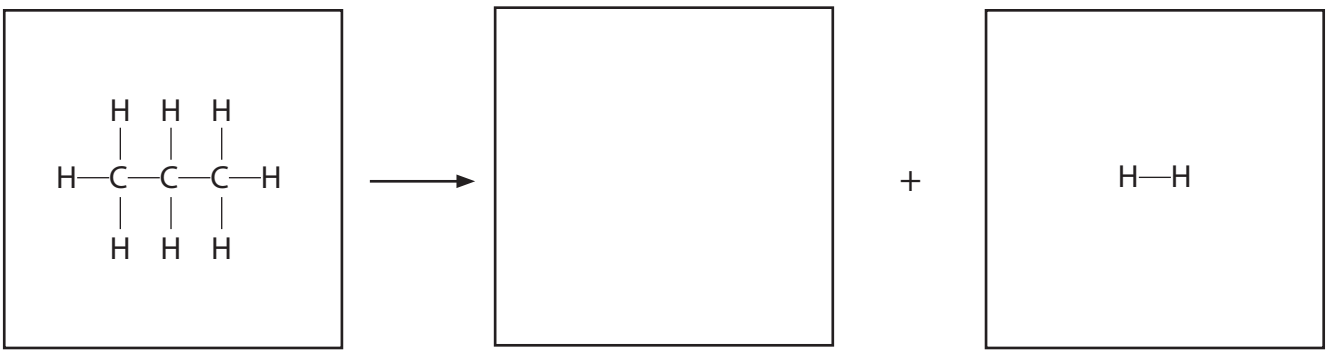
☒ **D** have molecules that each have a C═C bond

(b) When propane is heated it can form propene and one other product.

Complete the word equation and then draw the structure of propene, showing all bonds, in the empty box.

(3)

propane → propene + ...



(Total for Question 3 = 10 marks)

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Limestone

4 (a) Limestone is a rock which often occurs as layers and contains fossils.

Which type of rock is limestone?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** igneous

☒ **B** magma

☒ **C** metamorphic

☒ **D** sedimentary

(b) Give a large-scale use of limestone.

(1)

.....

(c) Limestone is extracted in large quantities from quarries.

Explain why some people might object to the opening of a limestone quarry near to where they live.

(2)

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(d) Limestone is a naturally occurring form of calcium carbonate.

Calcium carbonate can be broken down by heating to form calcium oxide and carbon dioxide.

(i) Write the word equation for this reaction.

(2)

.....

(ii) When 5.0 g of calcium carbonate was completely decomposed, 2.8 g of calcium oxide was formed.

Calculate the mass of carbon dioxide gas given off in this reaction.

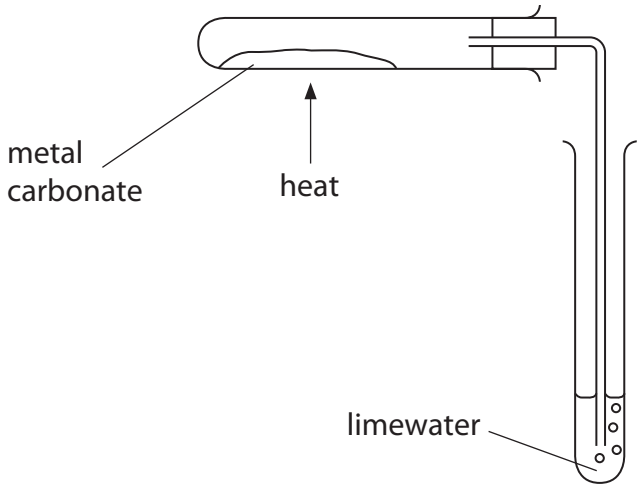
(1)

mass of carbon dioxide = ... g

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(e) A student investigated the ease of decomposition of three metal carbonates.
Equal masses of each metal carbonate were heated.
The time taken for carbon dioxide to be detected was measured.

The following apparatus was used.



The table shows the observations and the time taken for carbon dioxide to be detected.

metal carbonate	observations	time taken for carbon dioxide to be detected / s
calcium carbonate	powder remains white	180
zinc carbonate	white powder turns yellow when hot but is white when cold	105
copper carbonate	green powder turns black	36

(i) All the carbonates have undergone a reaction.

Give the evidence that shows that all three carbonates have reacted.

(1)

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(ii) Explain how the results show the order of the ease of decomposition of these three metal carbonates.

(2)

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(Total for Question 4 = 10 marks)

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Polymers and fuels

5 (a) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

Methods used to dispose of polymers are recycling, burning and putting in a landfill site.
When waste polymers are burned, most of the products are gases.

An advantage of disposing of polymers by burning is

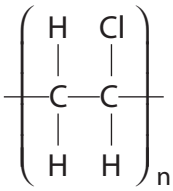
☒ **A** carbon dioxide is released

☒ **B** toxic gases are released

☒ **C** the mass of solid waste is reduced

☒ **D** the solid waste is recycled

(b) The formula of the polymer poly(chloroethene) is shown.



(i) Give the name of the monomer used to make poly(chloroethene).

(1)

.....

(ii) Describe how monomer molecules form polymer molecules.

(2)

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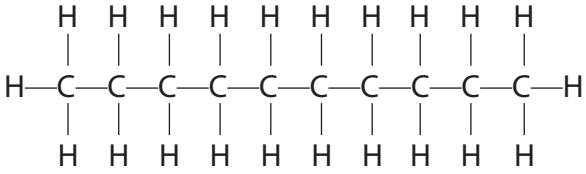
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(c) The structure of a molecule of a substance found in a fuel is



Explain why this substance is described as a **saturated hydrocarbon**.

(2)

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*(d) Many different substances are used as fuels.

Several factors contribute to making a substance a good fuel.

Examples of good fuels are ethanol, methane and petrol.

Describe some of the factors that make a substance a good fuel, explaining the advantages and disadvantages of **one** of the fuels listed above.

(6)

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(Total for Question 5 = 12 marks)

Hydrochloric acid

6 (a) Dilute hydrochloric acid can be used to make salts.
These salts are called chlorides.

Which of the following will **not** react with dilute hydrochloric acid to produce zinc chloride?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** zinc carbonate

☒ **B** zinc hydroxide

☒ **C** zinc oxide

☒ **D** zinc sulfate

(b) Hydrochloric acid is present in the stomach.

(i) Describe the purpose of hydrochloric acid in the stomach.

(2)

.....

.....

.....

.....

(ii) Indigestion tablets can be used to neutralise excess hydrochloric acid in the stomach.

Some indigestion tablets contain aluminium hydroxide.

Write the word equation for the reaction of aluminium hydroxide with hydrochloric acid.

(2)

.....

.....

(c) Electrolysis can be used to decompose hydrochloric acid.
The products of electrolysis are hydrogen and chlorine.

Complete the balanced equation for this reaction.

(1)

$2HCl \rightarrow H_2 +$ .....

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*(d) Chlorine and hydrogen are manufactured by the electrolysis of saturated sodium chloride solution.
The gases have important uses so must be produced in large amounts.
However both gases are hazardous and leaks of the gases would be very serious.

Describe the important uses and the hazards of each gas and the test for chlorine that might be used to detect a small leak of the gas.

(6)

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(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE

In Chemistry (5CH1F) Paper 1F



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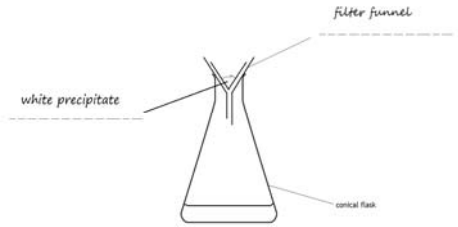
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Summer 2017
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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Marks
1 (a)(i)	☒ **B** calcium hydroxide The only correct answer is B **A** is not correct because limewater is calcium hydroxide solution, not HCl(aq) **C** is not correct because limewater is calcium hydroxide solution, not NaCl(aq) **D** is not correct because limewater is calcium hydroxide solution, not NaOH(aq)	**(1)**

Question number	Answer	Acceptable answers	Marks
1(a)(ii)	• (filter) **<u>funnel</u>** (1) • precipitate / residue / solid / calcium carbonate (1)  	Reject filter paper Allow filter funnel **AND** paper Ignore any named forms of $CaCO_3$ (eg limestone)	**(2)**

Question number	Answer	Acceptable answers	Marks
1 (b) (i)	{dissolving in/ absorbed by} the {oceans/seas} / **<u>photosynthesis</u>**	No alternatives to photosynthesis	**(1)**

Question number	Answer	Acceptable answers	Marks
1 (b) (ii)	volcanoes/ forest fires/ **<u>respiration</u>** / decomposition <u>of plant matter</u>	Ignore breathing	**(1)**

Question number	Answer	Acceptable answers	Marks
1 (c) (i)	methane + oxygen → carbon dioxide + water fully correct equation (2) If not correct, allow (1) for : water as a product / methane **and** oxygen on LHS **and** carbon dioxide on RHS of equation (1)	ignore formulae allow = for → reject any equations with >1 → ignore heat on RHS If heat on LHS – mark as 'if not correct'	**(2)**

Question number	Answer	Marks
1 (c) (ii)	☒ **B** diesel oil The only correct answer is B **A** is not correct because bitumen is not used as a fuel **C** is not correct because hydrogen is used in much lower amounts than diesel **D** is not correct because oxygen is not a fuel	**(1)**

(Total for Question 1 = 8 marks)

Question number	Answer	Marks
2 (a)	**A** gold The only correct answer is A **B** is not correct because iron is too reactive to be found uncombined **C** is not correct because potassium is too reactive to be found uncombined **D** is not correct because zinc is too reactive to be found uncombined	**(1)**

Question number	Answer	Acceptable answers	Marks
2 (b) (i)	(lead oxide +) **carbon** → (1) (lead +) **<u>carbon dioxide</u> / <u>carbon monoxide</u>** (1)	ignore formulae No alternatives	**(2)**

Question number	Answer	Acceptable answers	Marks
2 (b) (ii)	oxygen (1)	O_2 ignore O	**(1)**

Question number	Answer	Acceptable answers	Marks
2 (c)	an explanation to include two of the following • aluminium oxide is (too) stable/ aluminium higher in the reactivity series than carbon / aluminium "more reactive than carbon"/ aluminium is too reactive / aluminium is a (very) reactive metal / aluminium high in reactivity series (1) • carbon cannot reduce aluminium (oxide)/ aluminium cannot be extracted using carbon / no reaction would occur (1) • **electrolysis** {is a strong / powerful method for reduction / can extract reactive metals / can extract a metal from a stable compound} (1)	Ignore references to energy Ignore 'needs electrolysis' 'must use electrolysis' etc	**(2)**

Question number	Answer	Acceptable answers	Marks
2 (d)	An explanation including Aluminium has…. • {low / lower} density (1) • (so) fewer pylons needed /easier to support (1) OR Aluminium has…. • {greater / good} resistance to corrosion (1) • (so) cables {will not need frequent replacement / will not be affected by weather / will not corrode / will last longer} (1)	Allow “lighter” / “weighs less” Ignore “will not rust” Allow • {low / lower} density (1) • {greater / good} resistance to corrosion (1) If listing lots of properties from table with no explanations, **apply list principle: If 3 properties, max 1; if 4/5 properties = 0**	**(2)**

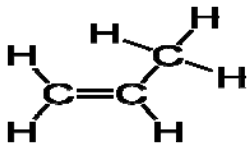
(Total for Question 2 = 8 marks)

Question number	Answer	Acceptable answers	Marks
3 (a) (i)	both points correctly plotted +/- half a small square (1) best-fit single line including at least the 4 pre-plotted carbons reasonably close to points (1)	 Reject dot-to-dot Could be ruled line or curve (the points should not all be on one side of the best fit line)	**(2)**

Question number	Answer	Acceptable answers	Marks
3 (a) (ii)	A description to include • the **<u>boiling point</u>** increases (1) • as the number of (carbon) atoms (in one molecule) increases (1)	Mark independently Ignore 'the temperature increases' Allow 'positive correlation **<u>between boiling point and number of carbon atoms</u>**' for 2 Just 'positive correlation' scores 1	**(2)**

Question number	Answer	Acceptable answers	Marks
3 (a) (iii)	answer from their graph +/- 2 (1) °C (1)	ONLY accept answer from (any) extrapolated graph line (whether line correct or not) – no line, no **first** mark Mark independently	**(2)**

Question number	Answer	Marks
3 (a) (iv)	**C** can burn in a limited supply of air to form carbon monoxide The only correct answer is C **A** is not correct because alkanes are hydrocarbons **B** is not correct because bromine does not react with alkanes **D** is not correct because alkanes have single bonds only	**(1)**

Question number	Answer	Acceptable answers	Marks
3 (b)	hydrogen (1)  (2) If incorrect, allow 3 carbon chain C=C-C or C-C=C with any number of H for (1)	Ignore H_2/ H Do not penalise small letters here Ignore bond angles	**(3)**

(Total for Question 3 = 10 marks)

Question number	Answer	Marks
4 (a)	**D** sedimentary The only correct answer is D **A** is not correct because limestone is sedimentary **B** is not correct because magma forms igneous rocks **C** is not correct because limestone is sedimentary	**(1)**

Question number	Answer	Acceptable answers	Marks
4 (b)	(making) cement / concrete / glass / steel / iron / (farmers use to) neutralise acidic soil / scrubbers on power stations	allow construction/ building materials / bricks / toothpaste / road making / statues/ monuments	**(1)**

Question number	Answer	Acceptable answers	Marks
4 (c)	An explanation to include **two** of the following • noisy (1) • dusty /smoke (1) • (dust causes) breathing problems (1) • {extra traffic/ lorries} on roads (1) • damages tourist industry (1) • adverse effect on property values (1) • destroys habitats / landscapes (1) • eyesore/ ugly etc (1)	Ignore all incorrect responses Ignore refs to CO_2 Ignore vague answers such as: bad for environment / (air) pollution / causes health problems / destroys wildlife / takes up space / destroys land etc	**(2)**

Question number	Answer	Acceptable answers	Marks
4 (d) (i)	calcium carbonate → calcium oxide + carbon dioxide calcium carbonate ONLY on LHS **(1)** calcium oxide, carbon dioxide (any order) ONLY on RHS **(1)**	ignore formulae allow = for → ignore 'heat' 'energy' on LHS or on arrow but not on RHS reject any equations with >1 →	**(2)**

Question number	Answer	Acceptable answers	Marks
4 (d) (ii)	5.0 – 2.8 (1) (=2.2) (g)	2.2 (g)	**(1)**

Question number	Answer	Acceptable answers	Marks
4 (e) (i)	**IN ALL THREE:** carbon dioxide is detected / produced / limewater goes milky (OWTTE)		**(1)**

Question number	Answer	Acceptable answers	Marks
4 (e) (ii)	An explanation linking one pair from • copper carbonate takes shortest time, then zinc carbonate, then calcium carbonate • the order of ease of decomposition of carbonates was copper (least stable), zinc, calcium (most stable) (1) OR • copper carbonate takes **<u>shortest</u>** time (for limewater to turn milky) (1) • copper carbonate is least stable / easiest to decompose (1) OR • calcium carbonate took the **<u>longest</u>** time (for limewater to turn milky) (1) • calcium carbonate is most stable/ hardest to decompose (1)	NOTE: ignore direct quotes from data unless explained	**(2)**

(Total for Question 4 = 10 marks)

Question number	Answer	Marks
5 (a)	☒ **C** the mass of solid waste is reduced The only correct answer is C **A** is not correct because carbon dioxide release is a disadvantage due to climate change **B** is not correct because toxic gas release is a disadvantage **D** is not correct because the solid waste is not recycled	**(1)**

Question number	Answer	Acceptable answers	Marks
5 (b) (i)	chloro**e**thene / vinyl chloride	**No alternatives** **Reject ChloroethAne**	**(1)**

Question number	Answer	Acceptable answers	Marks
5 (b) (ii)	A description including any two of • double bond breaks (1) • (monomer molecules/ named monomer/ alkenes) join/ bond/ link together (1) • to form large / long chain molecules (1)	Idea for second mark is connecting monomers (ignore 'react')	**(2)**

Question number	Answer	Acceptable answers	Marks
5 (c)	An explanation linking • (compound of) <u>hydrogen</u> and <u>carbon</u> (atoms) **<u>only</u>** (1) • no (C=C) double bonds/ single (C-C) bonds **<u>only</u>** (1)	Must name elements Ignore 'max no. of H bonded'/ it is alkane	**(2)**

Question Number		Indicative Content	Mark
QWC	***5d** **Exp**	A description to include some of the following points A good fuel • burns easily • produces little ash • produces little smoke • produces a lot of heat energy • is easy to store • is easy to transport • is readily available • makes no toxic waste products • is renewable • is flammable ETHANOL • (highly) flammable • liquid – easy to store/ transport • renewable • requires land to grow sugar crops • carbon dioxide absorbed in growing crops = that released on combustion/ carbon neutral METHANE • (highly) flammable • gas – hard to store • fossil fuel – non-renewable • gives off carbon dioxide when burnt • carbon dioxide causes global warming • can be produced as biofuel – renewable PETROL • (highly) flammable • liquid – easy to store and transport • fossil fuel – non-renewable/ supplies will be exhausted • gives off carbon dioxide when burnt • can release CO • which is toxic • carbon dioxide causes global warming • easily available in petrol stations • can release sulfur dioxide / NOx • which can lead to acid rain	**(6)**

Level	0	No rewardable content
1	1 - 2	• A limited description of at least one factor making a good fuel OR advantages and / or disadvantages of a fuel • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	• A simple description of some factors making a good fuel AND a description of the fuel considering advantages and/or disadvantages • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	• A detailed description of factors making a good fuel AND advantages AND disadvantages of a fuel • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

(Total for Question 5 = 12 marks)

Question number	Answer	Marks
6 (a)	**D** zinc sulfate The only correct answer is D **A** is not correct because the carbonate reacts **B** is not correct because the hydroxide reacts **C** is not correct because the oxide reacts	**(1)**

Question number	Answer	Acceptable answers	Marks
6 (b) (i)	A description to include • kills {bacteria / microorganisms / pathogens} (1) • helps digestion / breaks down food / digests food (1)	must be kills/ destroys OWTTE ignore germs allow viruses allow enables enzyme function	**(2)**

Question number	Answer	Acceptable answers	Marks
6 (b) (ii)	aluminium hydroxide + hydrochloric acid → aluminium chloride + water aluminium hydroxide, hydrochloric acid (any order) ONLY on LHS **(1)** aluminium chloride, water (any order) ONLY on RHS **(1)**	ignore formulae allow = for → reject any equations with >1 →	**(2)**

Question number	Answer	Acceptable answers	Marks
6 (c)	Cl_2	Capital C Small l Subscript 2 Reject: CL_2, cL_2, Cl^2, Cl2	**(1)**

Question Number		Indicative Content	Mark
QWC	***6d** **Exp**	A description to include some of the following points uses of the gases • chlorine for sterilizing/ treating tap/ drinking water • chlorine kills bacteria/microorganisms • chlorine used to treat / disinfect water in swimming pools (ignore 'cleans' etc) • chlorine for making bleach • chlorine for making polymers • chlorine for making poly(chloroethene) / PVC • hydrogen as a fuel for cars • hydrogen in fuel cells • hydrogen making ammonia/ in Haber process • hydrogen in weather balloons hazards of the gases • chlorine is **toxic/ poisonous** • inhaling chlorine can lead to death / breathing difficulties • hydrogen explodes / catches fire test for chlorine • for chlorine add (damp) litmus paper • (blue turns red then) bleached / turns white; (red) bleached / turns white	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• A limited description of uses or hazards (of chlorine, of hydrogen or one for each gas) OR description of test for chlorine • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• A simple description involving two of : uses of chlorine/hydrogen and hazards of chlorine/hydrogen and test for chlorine • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• A detailed description of uses and hazards of chlorine/hydrogen and the test for chlorine • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for Question 6 = 12 marks)

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Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Chemistry/Science

Unit C1: Chemistry in Our World

Foundation Tier

Thursday 19 May 2016 – Morning
Time: 1 hour

Paper Reference
5CH1F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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The Periodic Table of the Elements

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	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	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	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

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Questions begin on next page.

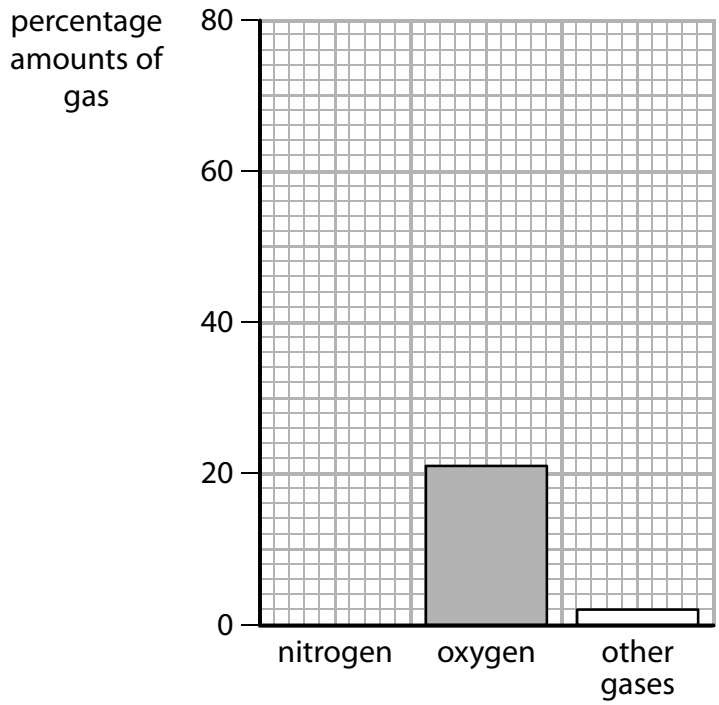
Answer ALL questions

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The atmosphere

1 (a) The bar chart shows the percentages of some gases in a sample of dry air from today's atmosphere.

The bar for the percentage of nitrogen is missing.



(i) The percentage of nitrogen is 78.

Add the bar to the chart to show this.

(1)

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

The bar chart shows the percentage of oxygen in this dry air is

☐ **A** 1

☐ **B** 11

☐ **C** 21

☐ **D** 31

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(b) In the Earth's early atmosphere there was little or no oxygen.

Explain what caused the percentage of oxygen in the atmosphere to increase.

(2)

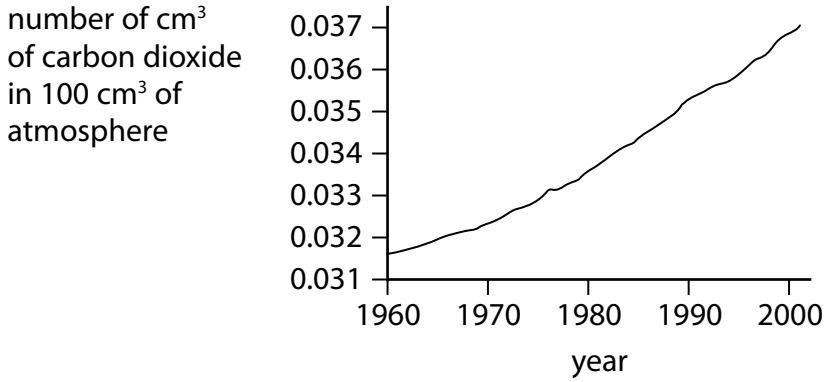
(c) Carbon dioxide is one of the other gases in the atmosphere.

(i) The formula of carbon dioxide is CO_2.

Describe what atoms are present in carbon dioxide.

(2)

(ii) The graph below shows the volume of carbon dioxide in the atmosphere between the years 1960 and 2000.



Explain one reason why the volume of carbon dioxide increased between the years 1960 and 2000.

(2)

(Total for Question 1 = 8 marks)

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Acids and electrolysis

2 (a) Acids can be neutralised.

Which of the following compounds will neutralise sulfuric acid?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** sodium chloride

☒ **B** sodium hydroxide

☒ **C** sodium nitrate

☒ **D** sodium sulfate

(b) Indigestion is caused by excess hydrochloric acid in the stomach.

Calcium carbonate neutralises the excess hydrochloric acid, producing calcium chloride, a gas and water.

Use words from the box to complete the word equation for this reaction.

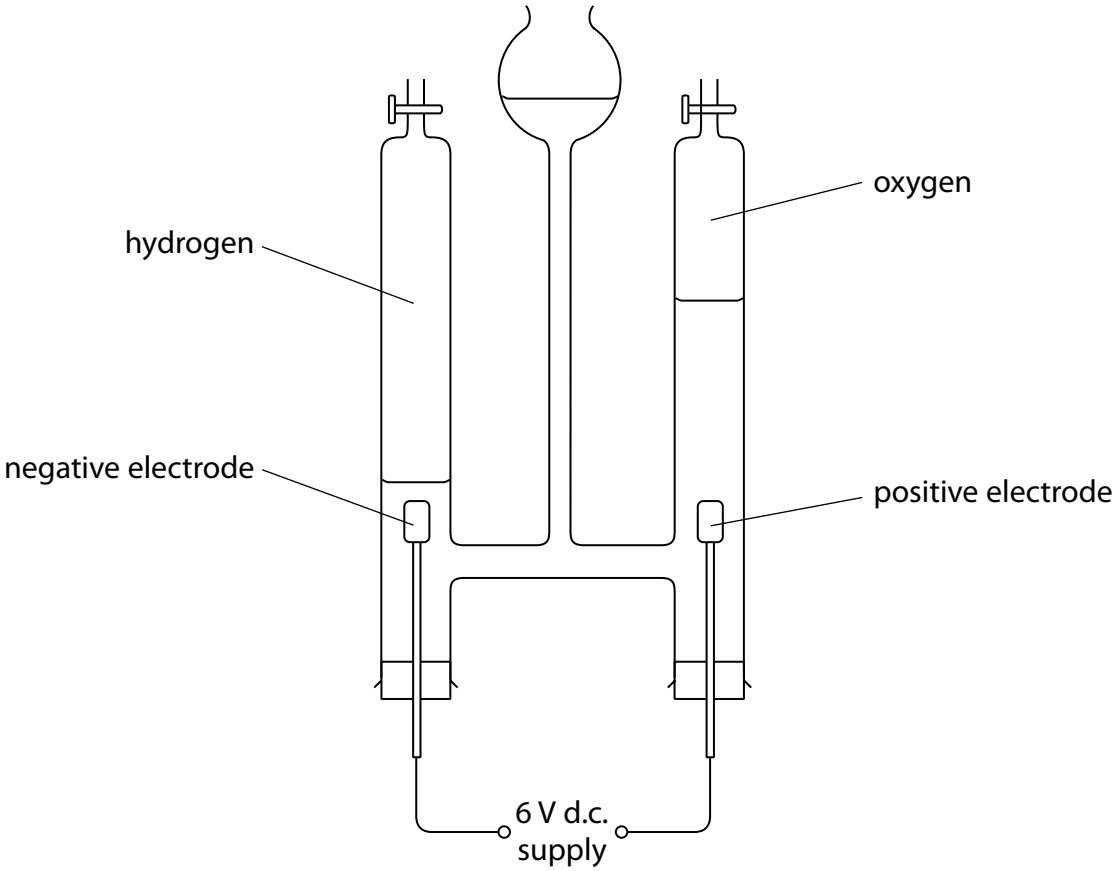
(2)

calcium hydroxide	calcium oxide	carbon dioxide
chlorine	hydrochloric acid	hydrogen

calcium carbonate + → calcium chloride + + water

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(c) Water is electrolysed in the apparatus shown.
The water decomposes to produce hydrogen and oxygen.



(i) Describe the test to show that one of the gases evolved is oxygen.

(2)

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(ii) After the experiment has started, the volumes of hydrogen and oxygen collected are measured after 2, 4 and 6 minutes.

The results are shown in the table.

time / minutes	volume of hydrogen / cm^3	volume of oxygen / cm^3
0	0.0	0.0
2	8.0	4.0
4	16.0	8.0
6	24.0	12.0

Describe what the results show about the volumes of hydrogen and oxygen produced during the experiment.

(2)

.....

.....

.....

.....

(d) When hydrochloric acid is electrolysed a gas is produced which bleaches damp blue litmus paper.

Give the name of this gas.

(1)

.....

(Total for Question 2 = 8 marks)

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Hydrocarbons

3 (a) Which of these is the formula of a hydrocarbon?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** C_2H_5Cl

☒ **B** C_2H_6

☒ **C** C_2H_6O

☒ **D** $NaHCO_3$

(b) Crude oil is a complex mixture of hydrocarbons.

(i) Give the name of the process used to separate crude oil into simpler mixtures.

(2)

.....

(ii) Petrol and kerosene are obtained from crude oil.
They are used as fuels.

Which line in the table shows the correct use of each fuel?

Put a cross (☒) in the box next to your answer.

(1)

	petrol used as fuel for	kerosene used as fuel for
☒ **A**	aircraft	cars
☒ **B**	cars	aircraft
☒ **C**	aircraft	ships
☒ **D**	cars	ships

(c) Propane reacts with oxygen to form carbon dioxide and water.

(i) Write the word equation for this reaction.

(2)

.....

(ii) Propane is an alkane.

Give the formula of a molecule of propane.

(2)

.....

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(d) Explain a problem caused by incomplete combustion of hydrocarbons.

(2)

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(Total for Question 3 = 10 marks)

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Metals

4 (a) Metals are extracted from ores found in the Earth's crust.

Draw a straight line from each metal to the method used to extract the metal from its ore.

(3)

metal	method of extraction from ore
aluminium	fractional distillation
gold	separating the uncombined metal
iron	heating with carbon
	electrolysis

(b) When a mixture of zinc oxide and carbon is heated, zinc metal is formed.

(i) Complete the word equation for this reaction.

(2)

zinc oxide + ... → zinc + ...

(ii) In this reaction zinc oxide has lost oxygen to form zinc.

State the name of the change that occurs when a compound loses oxygen.

(1)

.....

(c) Copper is used in electric wires.

State **two** properties of copper that make it suitable for this use.

(2)

property 1 .....

.....

property 2 .....

.....

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(d) Gold jewellery is made of alloys containing gold and copper.
These alloys are stronger than pure gold.

Gold atoms are bigger than copper atoms.

Use this information to explain why these gold alloys are stronger than pure gold.

(2)

.....

.....

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(Total for Question 4 = 10 marks)

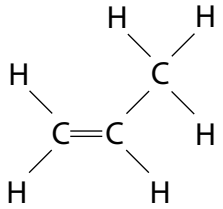
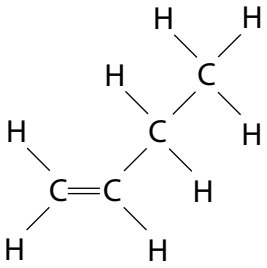
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Alkenes and polymers

5 (a) This table showing the names, molecular formulae and structures of the three alkenes is incomplete.

Complete the table.

(3)

name of alkene	molecular formula	structure
ethene	C_2H_4	
	C_3H_6	
butene		

(b) Describe what is **seen** when bromine water is added to a sample of a liquid alkene and the mixture is shaken.

(2)

.....

.....

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(c) In industry alkenes are formed when large alkane molecules are broken down into smaller alkane molecules and alkenes.

What is the name of this process?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** combustion

☒ **B** cracking

☒ **C** neutralisation

☒ **D** precipitation

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*(d) The uses of polymers are related to their properties.

The uses of some common polymers are shown in the table.

polymer	uses
poly(ethene)	plastic bags, plastic bottles, insulation for electrical wires
poly(chloroethene) (PVC)	window frames, gutters, insulation for electrical wires
poly(tetrafluoroethene) (PTFE)	coating for pans and skis, stain-proofing fabrics and carpets, containers for corrosive substances

A problem with polymers is that it is difficult to dispose of them after use.

Describe how the uses of these polymers are related to their properties, explaining the problems of disposing of these polymers.

(6)

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(Total for Question 5 = 12 marks)

Limestone

6 (a) The photograph shows a sample of limestone.



State what evidence in the photograph shows that the limestone is a sedimentary rock.

(1)

.....

.....

.....

(b) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

Limestone is an important raw material.

In industry limestone is **not** used as a raw material to make

☒ **A** cement

☒ **B** concrete

☒ **C** glass

☒ **D** marble

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(c) (i) When limestone is heated it breaks down to form calcium oxide and carbon dioxide.

Give the name of the process in which a substance is broken down by heating.

(2)

.....

(ii) Calcium hydroxide is formed when water is added to calcium oxide.

Write the word equation for this reaction.

(2)

.....

.....

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*(d) Sulfur impurity can be present in the coal used in coal-fired power stations.
As a result of the presence of the sulfur impurity, the gases from the chimneys of these power stations can produce acid rain.
Limestone can be used to reduce the emission of these harmful gases from the chimneys of coal-fired power stations.

Explain how acid rain is formed, the environmental problems caused by acid rain and how the use of limestone in the chimneys of coal-fired power stations reduces these problems.

(6)

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(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCSE in Chemistry (5CH1F) Paper 01
Unit C1: Chemistry in Our World

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Summer 2016
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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	bar drawn on the graph for nitrogen, to 78 ± ½ small square	**Ignore** width of line	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	C 21		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	An explanation linking (growth of primitive) plants **(1)** photosynthesis/ (plants take in carbon dioxide and) release/let out/produce oxygen **(1)**	 **Allow** trees **Reject** people planting **Reject** respiration/breathing	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	A description linking carbon (atom) **(1)** and oxygen (atoms) **(1)**	**Ignore** numbers of atoms/ symbols molecules = 1 mark max	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	**Both answers must come from the same pair.** An explanation linking any one of the following pairs burning/combustion **(1)** (fossil) fuels **(1)** **OR** deforestation/cutting down trees **(1)** reduces {the amount of carbon dioxide taken in/photosynthesis} **(1)** **OR** farming /increased {human/animal} population **(1)** breathing / respiration /exhaling carbon dioxide /decaying/decomposing **(1)** **OR** waste/dead organisms **(1)** decaying/rotting (in landfill) **(1)** **OR** limestone **(1)** decomposed/heated (in lime kiln) **(1)** **OR** volcano/volcanic **(1)** eruption(s) / activity / emits gas **(1)**	**Ignore** additional correct answers Maximum 1 mark if additional incorrect answers needs reference to burning **Ignore** driving/cars/pollution **Allow** named fossil fuel/any fuel that contains carbon **Ignore** other human activities	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)	B sodium hydroxide		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)	hydrochloric acid LHS **(1)** carbon dioxide RHS **(1)**	**Allow** correct formulae HCl **(1)** CO_2 **(1)** **Reject** hydrolic acid, HCL, hCl, carbon oxide, CO2, co2, Co2 and CO^2	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	**glowing** splint **(1)** MP1 relights **(1)** MP2 MP2 dependent on MP1	**Ignore** burned out/blown out splint lighted splint burns brighter **(2)**	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	A description linking • (volumes of oxygen and/or hydrogen) increase/bigger/goes up **(1)** • volume of hydrogen (evolved) is always greater than the volume of oxygen **(1)** **OR** A correct quantitative description/relationship linking volumes or time and volume • volume of hydrogen (evolved) is always double that of oxygen/ volume of oxygen is half that of hydrogen **(2)**	just quoting numbers does not show a relationship	**(2)**

	• as time increases the volume (of gas/oxygen /hydrogen) evolved increases OWTTE **(2)** • as the time doubles the volume(s) (of gas/both gases/oxygen / hydrogen) doubles **(2)** • volume (of gas evolved) is (directly) proportional to time **(2)**		

Question Number	Answer	Acceptable answers	Mark
2(d)	chlorine **(1)**	**Allow** Cl_2 **Reject** chloride, Cl, cl, cL	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)	B C_2H_6		**(1)**

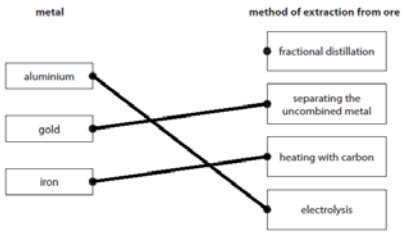
Question Number	Answer	Acceptable answers	Mark
3(b)(i)	fractional distillation **(2)**	**Allow** recognisable spellings distillation /fractionation **(1)**	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	B cars aircraft		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	propane + oxygen **(1)** {→ / =} carbon dioxide + water **(1)**	**Allow** reactants / products in either order, e.g. oxygen + propane LHS $C_3H_8 + O_2$ **(1)** RHS {→ / =} $CO_2 + H_2O$ **(1)** **Ignore** incorrect / no balancing **Reject** incorrect formulae. e.g. h^2O, h_2O, H_{20}, CO2, CO^2 and Co_2 If a mixture of words and formulae are used, max 1 mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	C_3H_8 (2)	C and H only with non subscripted/ incorrect / no numbers (1) **Allow** H_8C_3/correct structural/ displayed formula **Reject** 'h' for H	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)	**Both marks must come from the same pair.** An explanation linking one of the following pairs **EITHER** carbon monoxide/CO formed **(1)** toxic/poisonous / restricts the amount of oxygen carried (by the blood)/replaces oxygen in the blood/binds to red blood cells or haemoglobin/causes death **(1)** **OR** smoke/soot formed **(1)** damages lungs/chokes people/breathing difficulties/makes things dirty **(1)**	**Ignore** additional correct answers maximum 1 for additional incorrect answers **Ignore** carbon dioxide **Ignore** dangerous/harmful **Allow** the second mark if an incorrect gas e.g. methane **Allow** second mark if "gas" stated but no name is given **Allow** kills **Allow** less energy released **Allow** carbon **Ignore** harmful/dangerous **Allow** blocks fuel jets **Allow** less energy released	**(2)**

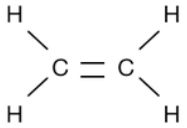
Question Number	Answer	Acceptable answers	Mark
4(a)		if more than one line drawn from/to any metal/method of extraction no marks can be scored **for that metal / method of extraction**	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	(zinc oxide +) **carbon** (→) **(1)** (zinc +) **carbon dioxide / monoxide (1)**	**Allow** correct symbol, C **(1)** **Ignore** carbon oxide **Allow** correct formula, CO_2 /CO **(1)**	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	reduction		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)	Any two from: • (good) electrical conductor **(1)** • ductile/drawn into a wire **(1)** • flexible/bendable **(1)** • unreactive / low reactivity/ resistant to corrosion **(1)** • high melting point/heat resistant **(1)**	**Ignore** (good) thermal conductor /conductor **Ignore** malleable **Ignore** rusting	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)	An explanation linking any two of • in pure gold the atoms/particles are all the same size **OR** in pure gold {layers/sheets/rows} (of atoms) {slide/slip/move} (over each other easily) **(1)** • (in the alloy there are two types/different sizes of atom/particle) so {structure/layers/sheets/rows} disrupted in alloy **(1)** • **stops/prevents** {atoms /particles /layers /sheets /rows} {sliding /slipping /moving} (over one another easily in alloy) **(1)**	**Allow** correct particle diagram(s) **Reject** molecules *once*	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)1	 **(1)**	**Ignore** bond angles	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)2	propene **(1)**	**Reject** propane	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)3	C_4H_8 **(1)**	H_8C_4 numbers must be subscript	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)	A description linking (turns) from orange / red / yellow / brown **(1)** to colourless/decolourises **(1)**	**Ignore** extra incorrect observations **Ignore** discoloured/clear/transparent **Allow** stays orange = max 1 mark **Reject** turns orange	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(c)	**B** cracking		**(1)**

Question Number		Indicative Content	Mark
QWC	***5(d)**	A description / explanation including some of the following points **properties related to uses** • **poly(ethene) :** **plastic bags / plastic bottles** – flexible/bendable, inert/unreactive, waterproof/weatherproof, light **insulation for electrical wires** – flexible, bendable, good insulator, waterproof/weather proof, inert/unreactive • **poly(chloroethene) :** **window frames / gutters -** tough/hard, long-lasting, durable/good insulator, waterproof/weatherproof, inert/unreactive **insulation for electrical wires –** flexible /bendable, good insulator, waterproof/weather proof, inert/unreactive • **poly(tetrafluoroethene):** **coating for pans -** slippery, non-stick, tough, high melting point/heat resistant, inert/unreactive **skis -** slippery **stain proofing fabrics and carpets –** slippery **containers for corrosive substances –** inert/unreactive **problems with disposal** **Ignore** references to cost and/or pollution <u>landfill</u> • (in landfill) non biodegradable/do not decay/rot/decompose/break down • waste persists in landfill sites OWTTE • landfill sites take up space or land / new sites needed when old ones filled • destroys habitats <u>burning</u> • (burning polymers) produces carbon dioxide/greenhouse gases • produces carbon monoxide • can release toxic/harmful fumes into the air • produces (toxic) ash <u>recycling</u> (different polymers) need to be separated in order to recycle	**(6)**

Level	0	No rewardable content
1	1 - 2	• a limited description / explanation e.g. one property related to use OR one problem of disposal • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	• a simple description / explanation e.g. an account including at least one properties related to uses and at least one problems with disposal OR a detailed description of at least two different properties related to uses or at least two problems with disposal • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	• a detailed description / explanation e.g. an account including at least two different properties related to uses AND at least one problem with disposal OR at least one property related to use AND at least two problems with disposal • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Question Number	Answer	Acceptable answers	Mark
6(a)	(contains) **fossils** **(1)**	**Allow** ammonite	**(1)**

6(b)	**D** marble		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(c)(i)	thermal decomposition (2)	decomposition (1) **Allow** recognisable spellings	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(c)(ii)	calcium oxide + water **(1)** {→ / =} calcium hydroxide **(1)**	**Allow** reactants in either order, e.g. water + calcium oxide LHS CaO + H_2O **(1)** RHS {→ / =} $Ca(OH)_2$ **(1)** **Ignore** incorrect / no balancing If a mixture of words and formulae are used, max 1 mark	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(d)**	A explanation including some of the following points **causes of acid rain** • burning sulfur/coal (in oxygen/air) • sulfur reacts with oxygen • produces sulfur dioxide • acidic gas • in atmosphere dissolves/mixes/absorbs/reacts in rain/clouds/water • to form acid solution/sulfuric acid/sulfurous acid/credit name/correct formula of an acid formed • sulfur dioxide causes acid rain **effects of acid rain** • damage/erosion/(chemical) weathering of buildings/monuments • acidification of lakes /soil/lowers pH • kills fish/aquatic life • kills/damages trees/ plants/ forests **reduction of the effects of acid rain by limestone** • calcium carbonate (from limestone) • acidic gas passed through calcium carbonate in chimney • (calcium carbonate) neutralises/reacts with acidic gases OWTTE • acidic gases prevented from entering the atmosphere	**(6)**

Level	0	No rewardable content
1	1 - 2	• a limited explanation e.g. at least one valid idea, e.g. a cause, an effect or a method of reduction of acid rain • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	• a simple explanation e.g. at least two ideas from one aspect OR a mention of a least two aspects • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	• a detailed explanation with ideas from all three aspects • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

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Surname	Other names

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Centre Number | | | | | |

Candidate Number | | | | |

Chemistry/Science

Unit C1: Chemistry in Our World

Foundation Tier

Thursday 14 May 2015 – Morning
Time: 1 hour

Paper Reference
5CH1F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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The Periodic Table of the Elements

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	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

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Questions begin on next page.

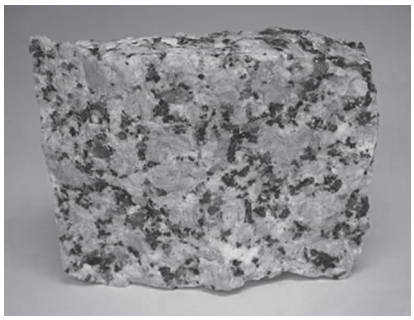
Answer ALL questions

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Rocks

1 Rocks can be described as igneous, metamorphic, or sedimentary.

(a) The photograph shows a sample of igneous rock.



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Describe how igneous rocks are formed.

(2)

.....

.....

.....

.....

(b) The table shows characteristics of three rocks, A, B and C.

rock	fossils	layers	easily eroded
A	no	no	no
B	yes	yes	yes
C	no	yes	no

Give the letter of the rock that is likely to be sedimentary.

(1)

.....

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(c) Limestone is a naturally occurring form of calcium carbonate.

When calcium carbonate is heated strongly, it decomposes to form calcium oxide and carbon dioxide.

(i) Write the word equation for this reaction.

(2)

..... → ..... + ...

(ii) Water is added, a drop at a time, to a lump of cold calcium oxide.

Describe what is **seen** as the water is added.

(2)

.....

.....

.....

.....

(d) In the Earth's crust, limestone can change into a metamorphic rock by the action of heat and high pressure.

Give the name of the metamorphic rock formed.

(1)

.....

(Total for Question 1 = 8 marks)

Atmosphere

2 (a) Complete the sentence by putting a cross (☒) in the box next to your answer.

The Earth's earliest atmosphere is thought to have been formed by

(1)

- ☒ **A** animals breathing
- ☒ **B** photosynthesis in plants
- ☒ **C** the oceans cooling
- ☒ **D** gases from volcanoes

(b) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The Earth's earliest atmosphere contained large amounts of carbon dioxide.

The percentage of carbon dioxide in the Earth's atmosphere today is

(1)

- ☒ **A** less than 1%
- ☒ **B** 5%
- ☒ **C** 21%
- ☒ **D** 78%

(ii) Write the formula of a molecule of carbon dioxide.

(1)

.....

(iii) The percentage of carbon dioxide in the atmosphere has decreased since the Earth's earliest atmosphere.

Explain what has caused the amount of carbon dioxide in the atmosphere to decrease.

(2)

.....

.....

(iv) State one human activity that increases the amount of carbon dioxide in the atmosphere today.

(1)

.....

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(v) Describe the test to show that a gas is carbon dioxide.

(2)

.....

.....

.....

(Total for Question 2 = 8 marks)

Hydrochloric acid

3 Hydrochloric acid is present in the stomach to help digestion.

(a) State another effect hydrochloric acid has in the stomach.

(1)

.....

.....

(b) Complete the sentence by putting a cross (☒) in the box next to your answer.

Indigestion can occur when excess acid is present in the stomach.
To relieve the pain caused by indigestion, people take indigestion tablets.

Indigestion tablets in the stomach

(1)

- ☒ **A** dilute the excess acid
- ☒ **B** neutralise the excess acid
- ☒ **C** polymerise the excess acid
- ☒ **D** oxidise the excess acid

(c) Some indigestion remedies contain magnesium hydroxide.

Which of the following substances is formed when magnesium hydroxide reacts with hydrochloric acid in the stomach?

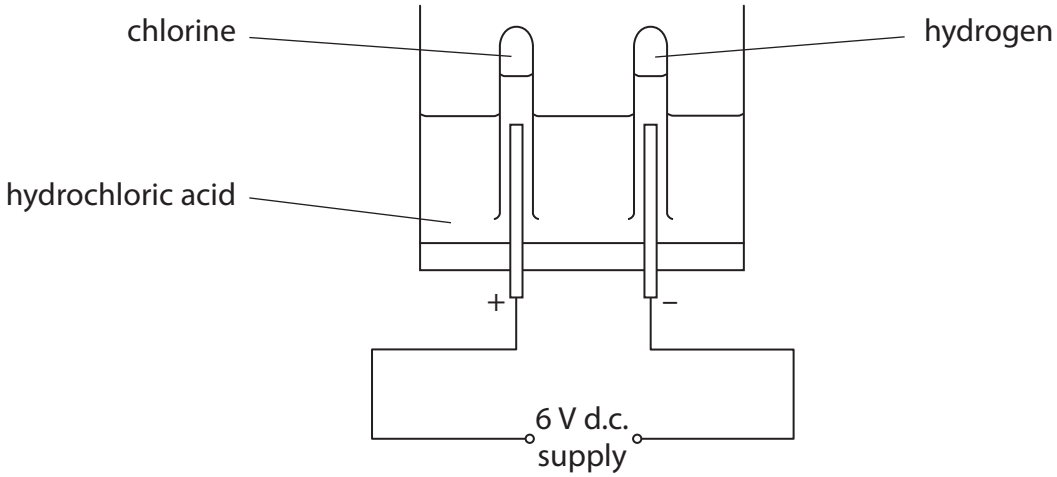
Put a cross (☒) in the box next to your answer.

(1)

- ☒ **A** magnesium chloride
- ☒ **B** magnesium carbonate
- ☒ **C** magnesium nitrate
- ☒ **D** magnesium sulfate

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(d) Hydrochloric acid can be used to make chlorine in the apparatus shown.



(i) The experiment shown is an example of electrolysis.

Explain the meaning of **electrolysis**.

(2)

(ii) Describe the test to show a gas is chlorine.

(2)

(iii) Great care has to be taken when chlorine is manufactured on a large scale.

Explain the potential hazards of storing large volumes of chlorine.

(2)

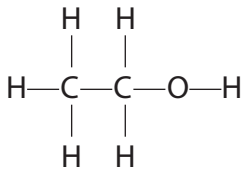
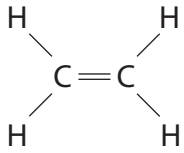
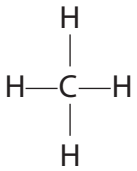
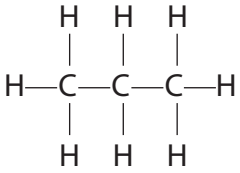
(iv) State a large-scale use of chlorine.

(1)

(Total for Question 3 = 10 marks)

Hydrocarbons

4 (a) The table shows the name and structure of four different organic molecules.

name	structure
ethanol	
ethene	
methane	
propane	

Use the information in the table to answer the following questions.
Each of the molecules can be used once, more than once, or not at all.

(i) Give the name of the molecule that is **not** a hydrocarbon.

(1)

.....

(ii) Give the name of the molecule that is unsaturated.

(1)

.....

(iii) Give the name of the molecule that is used as a monomer in a polymerisation reaction.

(1)

.....

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(b) Bromine water is used to distinguish between alkenes and alkanes.

Describe what would be **seen** when an alkene and an alkane are shaken with separate samples of bromine water.

(3)

alkene .....

.....

alkane .....

.....

(c) PTFE (poly(tetrafluoroethene)) is a polymer used to coat some frying pans.



Give **two** reasons why PTFE is used as a coating for frying pans.

(2)

reason 1 .....

.....

reason 2 .....

.....

(d) The disposal of items made of polymers can cause problems.

Explain **one** of the problems associated with the disposal of these items.

(2)

.....

.....

.....

.....

(Total for Question 4 = 10 marks)

Renewable fuels

5 Bioethanol and hydrogen are fuels that can be used instead of fossil fuels.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

All fuels **must**

(1)

- ☒ **A** be liquid at room temperature
- ☒ **B** burn slowly
- ☒ **C** produce heat energy when they burn
- ☒ **D** produce no waste gases when they burn

(b) Hydrogen is used as a fuel in the engines of some vehicles.

In these engines hydrogen reacts with oxygen to form water.

(i) Write the word equation for this reaction.

(2)

.....

(ii) State one advantage of using hydrogen, rather than petrol, as a fuel for vehicles.

(1)

.....

.....

(iii) Explain one disadvantage of using hydrogen as a fuel for vehicles.

(2)

.....

.....

.....

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*(c) Bioethanol is a biofuel which is produced from plant material.

Petrol is a fossil fuel which is obtained from crude oil.

Describe the advantages and disadvantages of using bioethanol, rather than petrol, as a fuel for vehicles.

(6)

(Total for Question 5 = 12 marks)

Iron and steel

6 (a) Iron can be extracted from a naturally occurring substance called haematite.

State the name given to the naturally occurring substances from which metals are extracted.

(1)

.....

(b) In the extraction of iron, iron oxide is heated with carbon to form iron.
A gas is also formed.

Write the word equation for this reaction.

(2)

.....

.....

(c) The table shows information about iron and two alloy steels.

metallic substance	density / kg m^{-3}	relative cost per tonne	relative strength	resistance to rusting
iron	7850	low	low	low
high speed steel	7850	high	very high	high
stainless steel	7480 – 8000	high	very high	high

Use the information from the table to suggest reasons why iron is converted to these alloy steels.

(2)

.....

.....

.....

.....

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(d) Complete the sentence by putting a cross (☒) in the box next to your answer.

When iron nails are left exposed to air and water, the iron reacts to form rust.

In this reaction, iron is

(1)

☒ **A** oxidised

☒ **B** crystallised

☒ **C** neutralised

☒ **D** reduced

*(e) Metals are extracted by different methods which are linked to their position in the reactivity series of metals.

Iron is extracted from iron oxide by heating with carbon.
Gold is found uncombined in the Earth's crust.
Aluminium is extracted from aluminium oxide using electrolysis.

The list shows part of the reactivity series with iron, gold and aluminium missing.

calcium
magnesium

.....

zinc

.....

tin
lead

.....

Use the information given about the methods of extracting these metals to explain where in this reactivity series iron, gold and aluminium are placed.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE in Chemistry (5CH1F) Paper 01
Unit C1: Chemistry in Our World

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Acceptable answers	Mark
1(a)	A description including two from • (molten / liquid) magma/lava (1) • (magma/lava)cools (1) • solidifies (1)	 Allow {molten/liquid} rock crystallises ignore hardens	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)	**B**		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	calcium carbonate → calcium oxide + carbon dioxide (2)	LHS (1) RHS (1) Correct formula	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	A description including any **two** of • cracks (1) • crumbles / breaks up (1) • steam formed (1) • fizzes /effervesces (1) • white powder / paste(1)	 allow swells/expands/erodes allow smoke allow bubbles ignore dissolves ignore heat given off / temperature rises	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(d)	marble (1)		**(1)**

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2(a)	**D** gases from volcanoes		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	**A** less than 1%		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	CO_2	CO must be capitals Reject Co 2 must be subscript	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	An explanation linking any two from **EITHER** • photosynthesis(1) • in (green) plants (1) • (carbon dioxide) absorbed (1) **OR** • (carbon dioxide) is soluble (in water) / dissolves (1) • in oceans (1)	Reject respiration Ignore breathe in (carbon dioxide) reference to formation of skeletons / carbonate rock	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(iv)	burning fossil fuels / burning {petrol / fossil fuel} (in vehicles) /deforestation	ignore cars/driving unqualified allow breathing / respiration	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(v)	a description linking second marking point is dependent on first • limewater • (turning) cloudy/milky/white ppt		**(2)**

Total for question 2 = 8 marks

Question Number	Answer	Acceptable answers	Mark
3(a)	to kill bacteria (1)	to kill microorganisms /pathogens / maintain the correct acidity / lower pH ignore kills germs ignore acid indigestion	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)	**B** neutralise the excess acid		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)	**A** magnesium chloride		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(d)(i)	An explanation including • decomposing / breaking down of (compounds) (1) • using electrical energy / electricity /direct current /d.c. supply (1)	 allow 'splitting up' ignore 'separate' reject breaking down of elements	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)(ii)	A description including • (damp blue) litmus • turns (red then) white / bleached	use of any suitable indicator (1) with correct result (1) eg universal indicator paper is bleached (2)	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)(iii)	An explanation including any two of • (chlorine) could escape/leak (1) • (chlorine is) toxic / corrosive / poisonous (1) • an effect on people eg death / injury / damage lungs /damage eye	 Ignore 'chlorine is dangerous' Allow harmful to people	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)(iv)	Any one of • (to make) plastics / PVC / bleach • to purify / sterilise water	 Ignore '(cleans) swimming pools'	**(1)**

Total for Question 3 = 10 marks

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	ethanol	C_2H_5OH / C_2H_6O / CH_3CH_2OH Do not allow superscript numbers in formula or non-capitals	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	ethene	C_2H_4 / CH_2CH_2 Do not allow superscript numbers in formula or non-capitals	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(iii)	ethene	C_2H_4 / CH_2CH_2 Do not allow superscript numbers in formula or non-capitals	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)	a description linking • bromine water is/starts orange (1) • (alkene) bromine water turns colourless/decolourises (1) • (alkane) bromine water remains/stays orange / no change (1)	allow red/brown/yellow for colour of bromine water ignore clear ignore discoloured	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(c)	• non-stick/slippery (1) • high melting point / does not melt during cooking (1)	easy to clean does not react with food/does not corrode / non-toxic	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)	an explanation linking **EITHER** • non-biodegradable/do not rot/persist/remains for many years • fills/takes up space in landfill site • (may) harm animals **OR** Second mark is dependent on first • if disposed of by burning • produce toxic / harmful products		**(2)**

Total for Question 4 = 10 marks

Question Number	Answer	Acceptable answers	Mark
5(a)	**C** produce heat energy when they burn		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(i)	hydrogen + oxygen → water LHS (1) RHS (1)	Correct formula Allow hydrogen oxide	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b) (ii)	does not produce harmful {gases / products} /water produced can be used to make more hydrogen/ only produces water/renewable/does not produce carbon dioxide	Answer must imply/refer to hydrogen	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(iii)	an explanation linking **EITHER** • escaping/leaked hydrogen (mixes with oxygen or air) • (if ignited), will explode **OR** • hydrogen is a {colourless/odourless} gas • leaks possible / undetectable **OR** • hydrogen expensive to produce • electricity needed / expensive **OR** • hydrogen has to be stored in strong / heavy tanks in the car • heavy tanks cause use of more fuel / are expensive **OR** • fewer hydrogen pumps/stations • difficult to refuel **OR** • high pressure needed • {storage/transport} is difficult/ hydrogen has to be stored in strong / heavy tanks	ignore flammable/dangerous ignore references to cost unless qualified	**(2)**

Question Number		Indicative Content	Mark
QWC	***5(c)**	description including some of the following points <u>advantages</u> • (the source) renewable / sustainable • photosynthesis (in plants) uses up carbon dioxide • photosynthesis (in plants) produces oxygen • no net increase in carbon dioxide • conserves petrol/crude oil • no sulfur impurity to remove from the bioethanol • do not release sulfur dioxide <u>disadvantages</u> • growing plants use up land • land could be used for food crops • loss of biodiversity/animal habitats • low yield of bioethanol from plants ignore 'carbon neutral' ignore references to cost ignore biofuels are reusable ignore references to acid rain ignore biofuels are used up quicker	**(6)**
Level	**0**	No rewardable content	
1	**1 – 2**	• a limited description of one advantage or disadvantage • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 – 4**	• a simple description of an advantage and a disadvantage or a detailed description of one advantage or disadvantage or two advantages or two disadvantages. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 – 6**	• a detailed description of a number of advantages and disadvantages • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Question 5 = 12 marks

Question Number	Answer	Acceptable answers	Mark
6(a)	ores (1)	metal ores	**(1)**

Question Number	Answer	Acceptable answers	Mark
6(b)	iron oxide + carbon → iron + carbon {dioxide / monoxide} (2) LHS (1) RHS (1)	Correct formula	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(c)	• to {increase/higher/raised} strength (1) • to {increase/higher/raised} resistance to rusting (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
6(d)	**A** oxidised		**(1)**

Question Number		Indicative Content	Mark
QWC	***6(e)**	A description including some of the following points • gold is least reactive • gold is placed in the lowest position • electricity needed to extract aluminium • reduction / extraction • electricity is the most powerful method (of extraction) • aluminium is very reactive / most reactive • aluminium is more reactive than carbon • aluminium is placed in the highest position • carbon is more reactive than iron • (hot) carbon reduces iron oxide • (hot) carbon does not reduce aluminium oxide • iron less reactive than aluminium / ORA • iron is not (commonly) found as uncombined metal • iron is more reactive than gold • iron is placed in the middle position	**(6)**
Level	**0**	No rewardable content	
1	**1 – 2**	• a limited description e.g. metals placed in correct positions without explanation / one metal placed in the correct position with explanation • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 – 4**	• a simple explanation e.g. metals placed in correct position and explanation given for one of them / explanations given for relative reactivity of two metals • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 – 6**	• a detailed explanation e.g metals placed in correct position and explanation for at least two of them. • The answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Question 6 = 12 marks

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Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Chemistry/Science

Unit C1: Chemistry in Our World

Foundation Tier

Thursday 15 May 2014 – Morning
Time: 1 hour

Paper Reference
5CH1F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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The Periodic Table of the Elements

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	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

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Questions begin on next page.

Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Changes in the atmosphere

1 (a) The Earth's earliest atmosphere was very different from the Earth's atmosphere today.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The Earth's earliest atmosphere was formed by

(1)

- ☒ **A** animals breathing
- ☒ **B** global warming
- ☒ **C** plants decaying
- ☒ **D** volcanic activity

(b) Use words from the box to complete the sentences.

Each word may be used once, more than once, or not at all.

argon	carbon dioxide	carbonates	neon	nitrogen

(3)

(i) The Earth's earliest atmosphere is thought to have contained

mainly .....

(ii) Over the years, carbon dioxide dissolved in the oceans and was absorbed by marine organisms.

The marine organisms eventually formed rocks which

are .....

(iii) The Earth's atmosphere today contains approximately 79%

of .....

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(c) There is much less water vapour in the Earth's atmosphere today than in the Earth's earliest atmosphere.

Explain how the amount of water vapour decreased.

(2)

.....

.....

.....

.....

(d) When plants first started to grow on the Earth they caused the composition of the atmosphere to change.

Describe how the composition of the atmosphere changed as a result of plants growing.

(2)

.....

.....

.....

.....

(Total for Question 1 = 8 marks)

Metals

2 (a) Metals are extracted from rocks found in the Earth's crust.

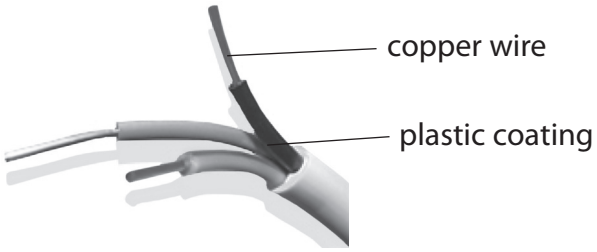
Complete the sentence by putting a cross (☒) in the box next to your answer.

Rocks from which metals are extracted are called

(1)

- ☒ **A** alloys
- ☒ **B** elements
- ☒ **C** ores
- ☒ **D** polymers

(b) Copper is used as the wire in electric cables.



State **two** reasons why copper is used as the wire in electric cables.

(2)

.....

.....

.....

.....

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(c) Iron is formed by heating a mixture of iron oxide and carbon.

(i) Complete the word equation for this reaction.

(2)

iron oxide + carbon → ..... + ...

(ii) In this reaction iron oxide is reduced to iron.

Describe what is meant by the term **reduced**.

(1)

.....

.....

(d) Metals in waste products are often recycled.

Describe the benefits of recycling metals.

(2)

.....

.....

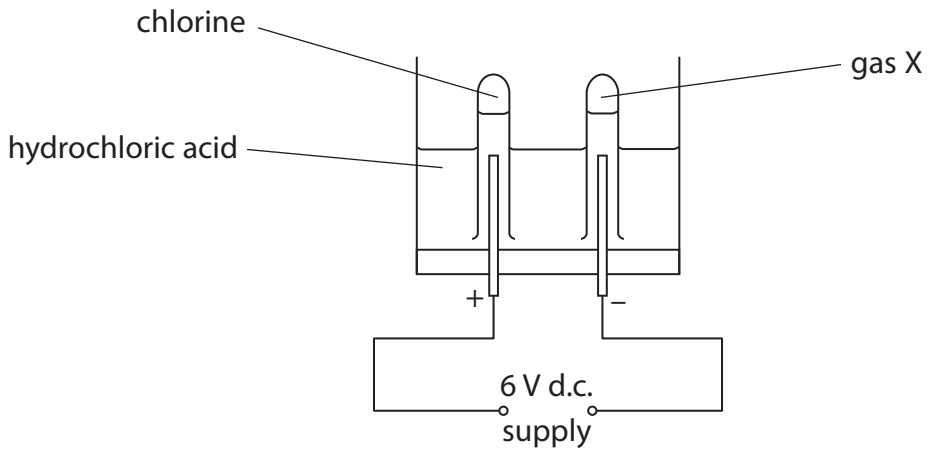
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(Total for Question 2 = 8 marks)

Hydrochloric acid and chlorine

3 Hydrochloric acid can be electrolysed to form two gases, using the apparatus shown in the diagram.



(a) Chlorine is one of the gases formed.

Give the name of gas X.

(1)

.....

(b) (i) Write the formula for a molecule of chlorine gas.

(1)

.....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Chlorine is used on a large scale to

(1)

☒ **A** neutralise soil acidity

☒ **B** neutralise acidic gases in power stations

☒ **C** manufacture bleach

☒ **D** manufacture poly(ethene)

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(iii) Describe a test to show a gas is chlorine.

(2)

.....

.....

.....

.....

(c) Hydrochloric acid is present in the stomach.

Describe what hydrochloric acid does in the stomach.

(2)

.....

.....

.....

.....

(d) Magnesium carbonate reacts with dilute hydrochloric acid.

Complete the word equation for this reaction

magnesium carbonate + hydrochloric acid → ..... + ... + ...

(3)

(Total for Question 3 = 10 marks)

Crude oil fractions

4 Crude oil can be separated into useful products.

(a) Crude oil is non-renewable.

State what is meant by the term **non-renewable**.

(1)

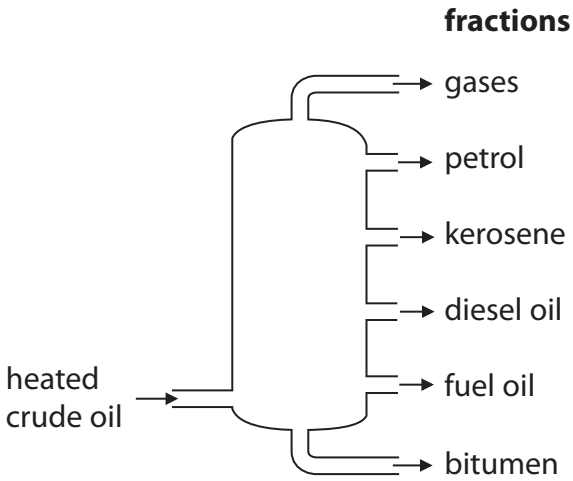
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(b) Crude oil is separated into fractions by fractional distillation.

The diagram shows a fractional distillation column and the fractions produced.



(i) Draw one straight line from each fraction to a use of that fraction.

(2)

fraction	use of fraction
kerosene	surfacing roads
fuel oil	fuel for large ships
bitumen	fuel for planes
	fuel for trains

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(ii) The petrol fraction and the diesel oil fraction have different physical properties.

Choose one property, describing the difference between the fractions.

(2)

.....

.....

.....

.....

(c) The petrol fraction contains octane, C_8H_{18}.

Octane is a hydrocarbon.

Describe what is meant by the term **hydrocarbon**.

(2)

.....

.....

.....

.....

(d) The oil industry uses a process to break down longer chain hydrocarbon molecules into shorter chain hydrocarbon molecules.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

(1)

This process is called

☒ **A** cracking

☒ **B** extraction

☒ **C** polymerisation

☒ **D** recycling

(ii) The shorter chain hydrocarbon molecules produced are alkanes and alkenes.

Bromine can be used to distinguish between alkanes and alkenes.

Describe what is **seen** when bromine water, which is orange-coloured, is shaken with an alkane and with an alkene.

(2)

.....

.....

.....

(Total for Question 4 = 10 marks)

Fuels

5 (a) Petrol is a flammable liquid.

Which hazard symbol is used on containers to show that the liquid in the container is flammable?

Put a cross (☒) in the box to show your answer.

(1)

☒ **A**



☒ **B**



☒ **C**



☒ **D**



(b) Some people suggest that hydrogen, rather than petrol, should be used as a fuel in cars but there are disadvantages in the widespread use of hydrogen.

Describe the disadvantages of hydrogen, rather than petrol, being used as a fuel in cars.

(3)

(c) Sulfur is an impurity in many fuels.

When fuels containing sulfur impurities are burnt, sulfur dioxide is released into the atmosphere.

Describe some problems this sulfur dioxide can cause.

(2)

.....

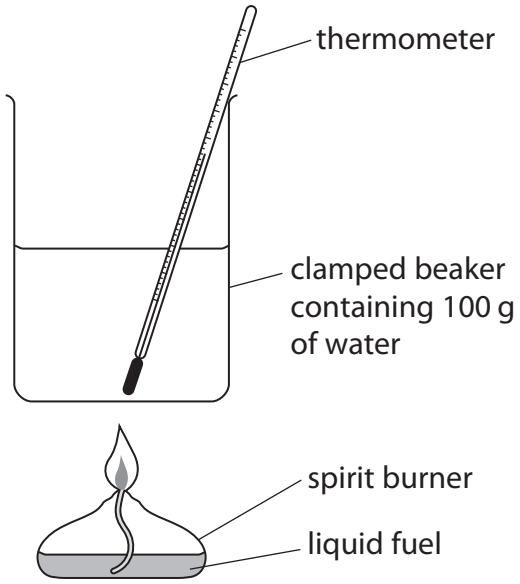
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*(d) Experiments were carried out to measure the heat energy given out when three liquid fuels, **A**, **B** and **C**, were burned.

In each experiment the same mass of fuel was used to heat the same volume of water, using the apparatus shown.



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Here are the results, together with the cost of the mass of fuel burnt in each experiment.

fuel	initial temperature of water (°C)	final temperature of water (°C)	cost of fuel burnt (pence)	observations of the way the fuel burns
A	15	51	3.0	burns with a blue flame – no smoke
B	16	21	0.5	burns with a yellow flame – black smoke
C	15	39	2.0	burns with a yellow flame – no smoke

A student considered these results and decided that fuel **B** was the best fuel.

Considering all the evidence for the fuels, **A**, **B**, and **C**, explain whether this is a good choice or not.

(6)

(Total for Question 5 = 12 marks)

Limestone

6 (a) Limestone occurs naturally as calcium carbonate.

When calcium carbonate, $CaCO_3$, is heated strongly, calcium oxide and carbon dioxide, CO_2, are formed.

(i) State the formula of calcium oxide.

(1)

.....

(ii) What type of reaction is this?

Put a cross (☒) in the box to show your answer.

(1)

☒ **A** incomplete combustion

☒ **B** oxidation

☒ **C** precipitation

☒ **D** thermal decomposition

(iii) Write the word equation for this reaction.

(2)

.....

(b) Limestone is a sedimentary rock.

Describe how sedimentary rocks are formed.

(2)

.....

.....

.....

.....

.....

.....

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*(c) The photograph shows a limestone quarry.



There is a proposal to open a limestone quarry near a village in a popular tourist area.

Evaluate the advantages and disadvantages to the local area of opening this quarry.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE in Chemistry (5CH1F) Paper 01

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Question Number	Answer	Acceptable answers	Mark
1(a)	**D** volcanic activity		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	carbon dioxide	CO_2	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	carbonates		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(iii)	nitrogen	N_2	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)	An explanation linking two of the following • {the Earth / water vapour} cooled (1) • water vapour condensed (1) • formed {oceans / seas} (1)	{rain / clouds} form rivers / lakes etc	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(d)	An explanation linking two of the following • photosynthesis (1) • carbon dioxide decreased / owtte (1) • oxygen increased / owtte (1)	plants take in carbon dioxide and / or release oxygen ignore reference to breathing	**(2)**

(Total for Question 1 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
2(a)	**C** ores		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)	Any two of the following • good conductor (of electricity) (1) • flexible (1) • ductile / can be made into (wires) (1)	bendy ignore malleable copper does not react / corrode	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	iron (1) carbon dioxide (1)	carbon monoxide / carbon oxide	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	loss of oxygen	gain of electrons ignore oxide	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(d)	A description including two of the following • preserves resources / ores (1) • stops **metals** going to landfill (1) • saves energy for extraction of new metal (1) • does not damage the landscape (1)	ignore arguments based on cost alone	**(2)**

(Total for Question 2 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
3(a)	hydrogen (1)		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	Cl_2	Ignore Cl / CL_2 / Cl2 / CL2 / Cl^2	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	**C** manufacture bleach		**(1)**

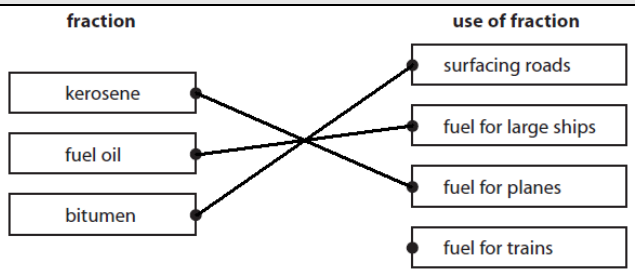
Question Number	Answer	Acceptable answers	Mark
3(b)(iii)	A description linking • (damp) (blue) litmus paper (1) • (reddens then) bleaches (1)	 ignore red (litmus) (damp) {universal indicator / pH} paper white ignore colourless	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)	A description including two of • (help) {digest / break down} food (1) • kill bacteria (1) • excess acid causes indigestion (1)	 ignore germs acid reflux	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)	magnesium chloride (1) carbon dioxide (1) water (1)	any order ignore formulae hydrogen oxide ignore (water) vapour	**(3)**

(Total for Question 3 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
4(a)	limited amount available / comes from a finite resource / using the crude oil quicker than it is made / it will run out / owtte	ignore cannot be used again / can only be used once	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	 (2)	Any two correct lines (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	A description including any from the list of physical properties (1) with a difference between the two (1) • boiling points (1) difference (1) • ease of {ignition / burning} (1) difference (1) • viscosity (1) difference (1) • colour (1) difference (1) • numbers of carbon / hydrogen atoms <u>in molecules</u> (1) difference (1)	melting point thickness / runniness ignore sticky size of molecule / chain length	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)	An explanation linking • carbon and hydrogen (atoms) (1) • just / only (carbon and hydrogen) (1)	reject mixture for the 1st mark allow H and C for 1st mark reject molecules for the 2nd mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)(i)	**A** cracking		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(d)(ii)	A description including • alkane - no change / remains orange (1) • alkene – turns colourless (1)	discoloured / decolourised ignore clear	**(2)**

(Total for Question 4 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
5(a)	**B** 		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)	A description including three of the following • expensive to produce hydrogen (1) • {storage / transport} is difficult (1) • can be explosive (when mixed with oxygen and ignited) (1) • lack of fuel stations providing hydrogen (1)	ignore unqualified responses regarding cost harder to store / higher pressure needed ignore dangerous / flammable ignore references to gases escaping ignore references to engine conversions	**(3)**

Question Number	Answer	Acceptable answers	Mark
5(c)	A description including • dissolves in rain / forms acid rain (1) • damages {plants / buildings} / other suitable effect of {acid rain / sulfur dioxide including its toxicity) (1)	ignore references to global warming breathing difficulties reject references to ozone layer	**(2)**

Question Number		Indicative Content	Mark
QWC	***5(d)**	A description including some of the following points • fuel B is the cheapest • fuel A is the most expensive • shows calculated temperature rises • fuel A – 36 ^{o}C, fuel B – 5 ^{o}C, fuel C 24 ^{o}C • fuel A shows biggest temperature rise • fuel B has the lowest rise • fuel B produces smoke which causes problems • fuel A burns completely / clean flame • fuels B and C – incomplete combustion • incomplete combustion forms carbon monoxide (which is toxic) • fuel C does not produce smoke • complete combustion, most energy given out to heat water • incomplete combustion wastes energy • shows calculated energy costs based on temperature rise • for 1 pence of fuel : Fuel A – 12 ^{o}C, fuel B 10 ^{o}C, fuel C 12 ^{o}C • A or C would be the best fuel as more energy efficient than B	**(6)**
Level	**0**	No rewardable content	
1	**1 – 2**	• a limited description e.g. fuel B is the cheapest OR mention of a merit or a demerit of at least one fuel • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 – 4**	• a simple description e.g. mention of some merits or demerits of at least two fuels OR comparison of all three fuels using information from one column of the table • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 – 6**	• a detailed description e.g. mention of some merits and demerits of all three fuels OR a reasoned argument for one fuel being better or worse than the others • The answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for Question 5 = 12 marks)

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	CaO	OCa Reject CAO / cao / CaO_2	**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	**D** thermal decomposition		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(iii)	calcium carbonate → calcium oxide + carbon dioxide (2) allow: calcium carbonate → (1) → calcium oxide + carbon dioxide (1)	allow = ignore heat $CaCO_3$ → (1) → CaO + CO_2 (1) incorrect balancing max 1 mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(b)	A description including two of the following • (sediments) fall to bottom of sea / build-up of layers (1) • compacted / squashed / under pressure / cemented (together) (1) • over (long period of) time (1)	ignore any effects of heat ignore layers in other rock types if time is mentioned has to be in the order of millions of years	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(c)**	A description including some of the following points **advantages** • provides jobs • provides essential raw material • boosts local economy **disadvantages** • noisy • dusty / smoke • extra traffic on roads • damages tourist industry • affects quality of life for local people • adverse effect of property values • quarry land cannot be used for farming • destroys original landscape • damages natural habitats	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description of an advantage or a disadvantage e.g. the quarry provides jobs for local people • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description of an advantage and a disadvantage OR at least two advantages OR at least two disadvantages e.g. the quarry provides jobs for local people but there's more heavy lorries on the road • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description of at least two advantages and a disadvantage OR an advantage and at least two disadvantages e.g. advantages include jobs for local people, but disadvantages include it is dusty and noisy and damages the tourist industry • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for Question 6 = 12 marks)

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Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Chemistry/Science

Unit C1: Chemistry in Our World

Foundation Tier

Thursday 23 May 2013 – Morning
Time: 1 hour

Paper Reference
5CH1F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P41936A

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1/1/1/1/C2

P 4 1 9 3 6 A 0 1 2 0

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The Periodic Table of the Elements

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	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

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Questions begin on next page.

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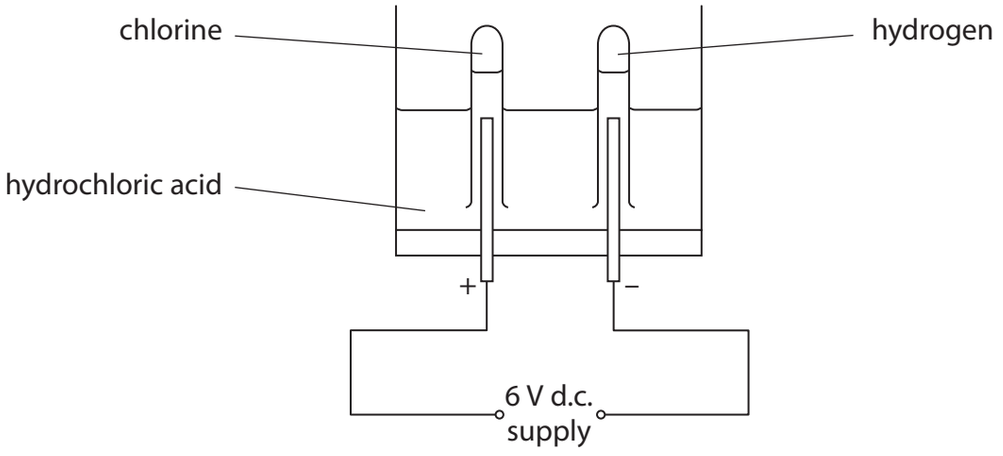
Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Acids and indigestion

1 (a) In this apparatus hydrochloric acid is decomposed by passing a direct electric current through it.

Chlorine and hydrogen are formed.



(i) Give the name of this process in which substances, such as hydrochloric acid, are decomposed by a direct electric current.

(1)

.....

(ii) Describe what happens when a burning splint is applied to a mixture of hydrogen and air in a test tube.

(2)

.....

.....

.....

P 4 1 9 3 6 A 0 4 2 0

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(b) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

An acid is present in the stomach of humans.

This acid is

(1)

☒ **A** ethanoic acid

☒ **B** hydrochloric acid

☒ **C** nitric acid

☒ **D** sulfuric acid

(ii) Some people suffer from indigestion and take indigestion remedies.

Which of these could cure indigestion caused by excess acid?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** sodium chloride

☒ **B** carbon dioxide

☒ **C** calcium carbonate

☒ **D** hydrogen chloride

(iii) Explain how an indigestion remedy works when it cures acid indigestion.

(2)

.....

.....

.....

.....

(c) Metal oxides react with acids to form a salt and water.

Complete the word equation for the reaction of magnesium oxide with nitric acid.

(2)

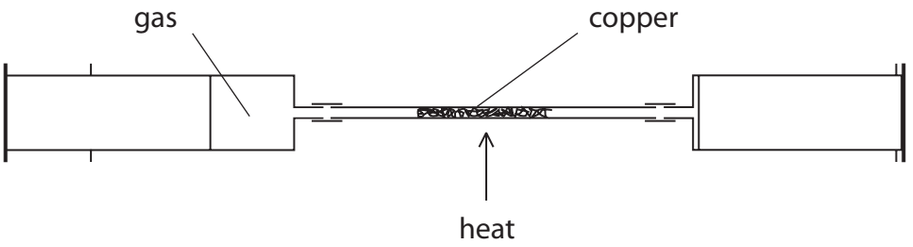
magnesium oxide + nitric acid → ..... + ...

(Total for Question 1 = 9 marks)

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The Earth's atmosphere

2 (a) This apparatus was used to find the percentage of oxygen in a sample of air.



Dry air was passed backwards and forwards over the hot copper.
The copper turned black.
The apparatus was allowed to cool.
The volume of gas in the apparatus had decreased.

(i) Explain why the volume of gas had decreased.

(2)

.....

.....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The percentage of oxygen in dry air is

(1)

☒ **A** 0.1

☒ **B** 1.0

☒ **C** 21

☒ **D** 79

P 4 1 9 3 6 A 0 6 2 0

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(b) The composition of the Earth's earliest atmosphere was different to that of the present atmosphere.

(i) Which of these gases was present in large amounts in the Earth's earliest atmosphere?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** oxygen

☒ **B** carbon dioxide

☒ **C** ammonia

☒ **D** nitrogen

(ii) The Earth's early atmosphere contained a larger percentage of water vapour than the Earth's atmosphere today.

Explain what happened to cause the percentage of water vapour in the Earth's atmosphere to decrease.

(3)

.....

.....

.....

.....

(Total for Question 2 = 7 marks)

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Metals

3 (a) Use words from the box to complete the sentences.

electricity	copper	carbon	methane	water

(2)

(i) Iron is extracted from its ore by heating the ore with ..... .

(ii) It is difficult to reduce aluminium ore to aluminium metal. Therefore,

to produce aluminium from its ore, it is necessary to use ..... .

(b) Lead oxide can be converted into lead by heating it with carbon.

The word equation for the reaction is

lead oxide + carbon → lead + carbon dioxide

Explain how this equation shows that lead oxide is reduced and carbon is oxidised.

(2)

.....

.....

(c) The table shows some information about the metals copper and aluminium

metal	ability to conduct electricity	density / g cm^{-3}
copper	good	8.9
aluminium	good	2.7

Overhead power cables, supported by pylons, are used to carry electricity around the country.

Use the information from the table to explain why aluminium, rather than copper, is used for overhead power cables.

(2)

.....

.....

.....

.....

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(d) Complete the sentence by putting a cross (☒) in the box next to your answer.

Stainless steel is an alloy containing iron and chromium.
Stainless steel is used instead of pure iron because it is

(1)

☒ **A** more reactive

☒ **B** weaker

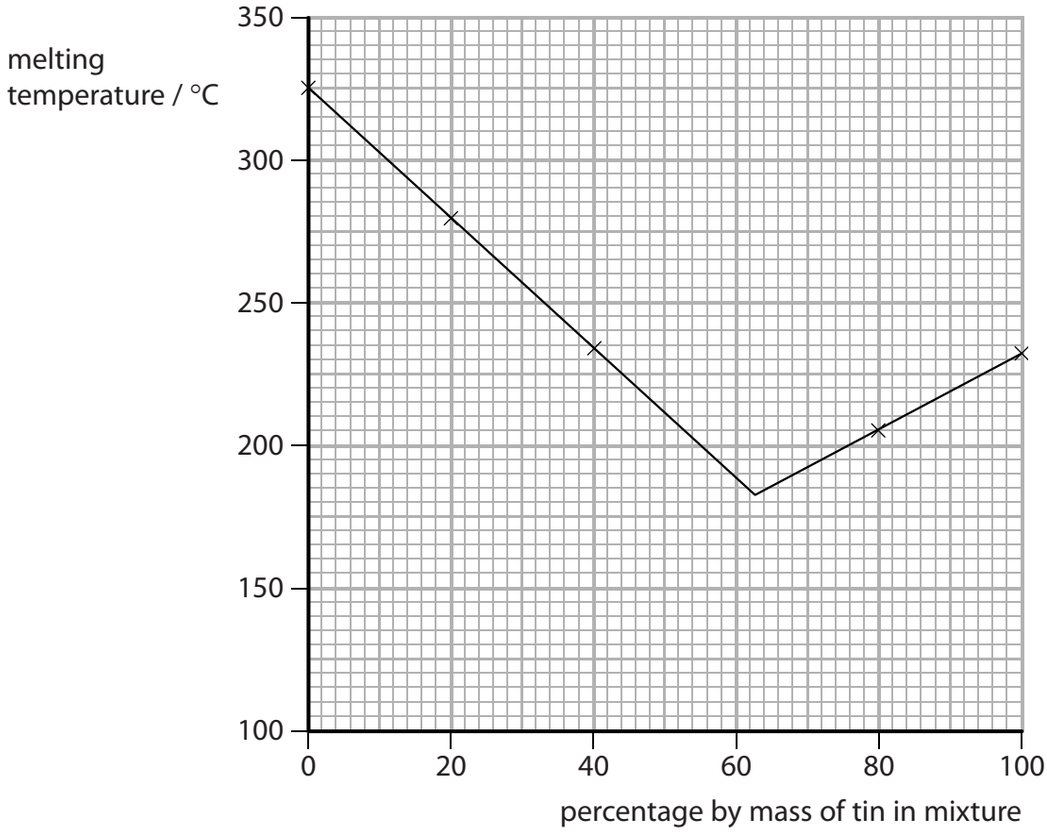
☒ **C** more flexible

☒ **D** more resistant to corrosion

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(e) Alloys are made by melting mixtures of metals and then leaving them to solidify.
Tin and lead form an alloy called solder.
Samples of solder containing different amounts of tin and lead were prepared.
The temperature at which each sample started to melt was recorded as the melting temperature.

The results are shown on the graph.



(i) Use the graph to find the percentage of tin in the mixture that has the lowest melting temperature.

(1)

..... %

(ii) Describe how the melting temperature changes as the percentage by mass of tin in the mixture increases from 0% to 100%.

(2)

.....

.....

(Total for Question 3 = 10 marks)

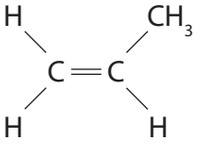
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Alkenes

4 (a) The table shows information about two alkenes.

Complete the table to show the names and structures of these alkenes.

(2)

name	structure of a molecule
ethene	
	

(b) (i) Ethene is an unsaturated compound.

State what is meant by **unsaturated**.

(1)

.....

(ii) Describe what is **seen** when ethene is passed into bromine water.

(2)

.....

.....

.....

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(c) Alkenes can be obtained by cracking some fractions obtained from crude oil.

Explain what is meant by **cracking**.

(2)

.....

.....

.....

(d) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Molecules of ethene are reacted together to form poly(ethene).
The reaction taking place is

(1)

☒ **A** combustion

☒ **B** photosynthesis

☒ **C** decomposition

☒ **D** polymerisation

(ii) Poly(ethene) is used to make plastic carrier bags.
Many of these bags are put into landfill sites.

Explain why the presence of waste plastic in landfill sites causes problems.

(2)

.....

.....

.....

.....

.....

(Total for Question 4 = 10 marks)

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Fuels

5 The photograph shows a Bunsen burner.



The burner uses methane as a fuel.

(a) Methane is a hydrocarbon.
The formula of a molecule of methane is CH_4.

Explain what is meant by a **hydrocarbon**.

(2)

.....

.....

.....

.....

(b) Complete the sentence by putting a cross (☒) in the box next to your answer.

Methane is a useful fuel because, when it burns, it produces

(1)

☒ **A** carbon dioxide

☒ **B** carbon monoxide

☒ **C** heat energy

☒ **D** a yellow flame

(c) Crude oil is a mixture of hydrocarbons.
It is separated into useful fractions.

Give the name of the process used to separate crude oil into fractions.

(1)

.....

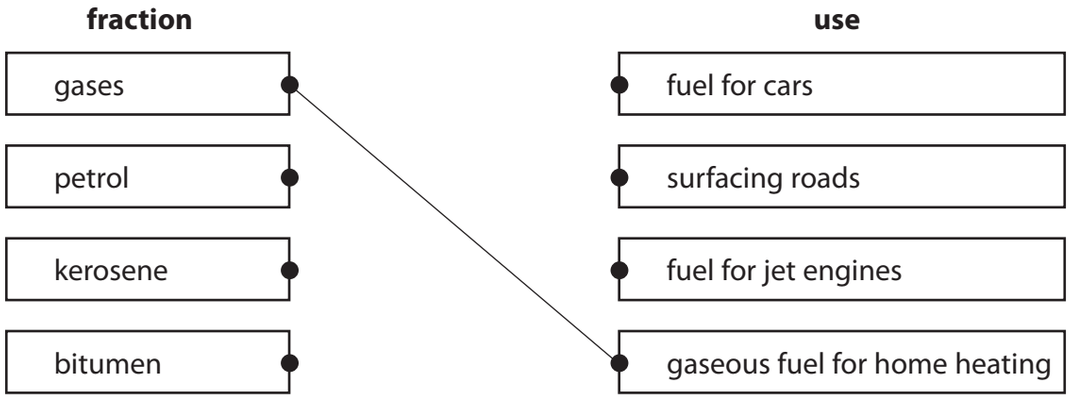
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(d) The table shows some crude oil fractions and some uses.

Draw one straight line from each fraction to its correct use.

One has been completed for you.

(2)



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*(e) When hydrocarbon fuels burn in a plentiful supply of air they undergo complete combustion, forming carbon dioxide and water vapour.

If the air supply is limited incomplete combustion occurs and carbon monoxide and carbon may be formed.

Describe the problems that can be caused by these products of complete and incomplete combustion.

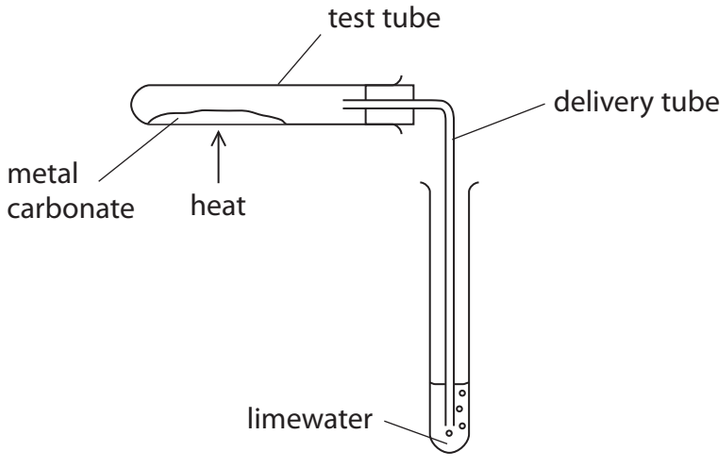
(6)

(Total for Question 5 = 12 marks)

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Metal carbonates

6 A student investigated the effect of heat on four metal carbonates.
Equal amounts of each carbonate were heated strongly, in the same way, in this apparatus.



The time it took for the limewater to turn milky was measured.

The table shows the student's results.

metal carbonate	time for limewater to turn milky /s
calcium carbonate	150
copper carbonate	20
lead carbonate	31
sodium carbonate	no change after 300 s

(a) At the end of each experiment, the delivery tube was removed from the limewater before removing the heat from the tube.

Explain why it was important not to remove the heat from the test tube while the delivery tube was still in the limewater.

(2)

.....

.....

(b) Suggest why the limewater did not turn milky when sodium carbonate was heated.

(1)

.....

(c) Complete the sentence by putting a cross (☒) in the box next to your answer.

The reaction that takes place when copper carbonate is heated is an example of

(1)

- ☒ **A** neutralisation
- ☒ **B** oxidation
- ☒ **C** thermal decomposition
- ☒ **D** dissolving

(d) Write the word equation for the reaction that takes place when copper carbonate is heated.

(2)

.....

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*(e) Calcium carbonate occurs naturally as limestone, which is an important raw material.
Calcium carbonate has many uses and can be converted into calcium oxide and calcium hydroxide.

By describing uses of these three calcium compounds, explain why limestone is such an important raw material.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

Summer 2013

GCSE Chemistry (5CH1F)
Paper 01

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	electrolysis	Allow any phonetically correct spelling	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	A description including **two** of the following • Burns/ ignites (1) • Squeaky (1) • pop/explodes (1) • water formed (1)	Ignore references to splint	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	**B** hydrochloric acid		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	**C** calcium carbonate		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(iii)	An explanation linking **two** of the following • alkali/ base (1) • (remedy) reacts with/ reduces/ removes (acid) (1) • (that is in) excess (1) • neutralises (acid) / pH raised/ forms water (1) • pain {removed/relieved} (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)	magnesium nitrate / $Mg(NO_3)_2$ (1) water /H_2O (1)	Reject hydrogen oxide	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	An explanation linking **two** of the following • copper reacts/ combines with/ added to (1) • **oxygen** (reacts/ removed/ decreased) (1)	Allow **copper** absorbs/ takes in **oxygen** for 1 Copper oxide formed / copper oxidised allow 2	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	C 21		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	B carbon dioxide		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	An explanation linking **three** of the following • {the Earth / atmosphere} cooled (1) • water vapour condensed • {liquid/ water/ rain} formed (1) • produced {sea/oceans}(1)		**(3)**

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	Carbon Exact spelling only	Ignore C	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	Electricity	Allow any phonetically correct spelling	**(1)**

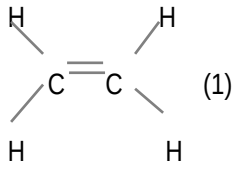
Question Number	Answer	Acceptable answers	Mark
3(b)	An explanation linking • lead oxide loses **oxygen**(1) • carbon gains **oxygen** (1)	**oxygen** {moved /transferred} from lead to carbon (2) oxide transferred gets no credit	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)	An explanation linking two of • <u>both</u> good conductors of electricity (1) • (aluminium) has low(er) density (1) • so <u>cables</u> lighter • (therefore) fewer pylons (1)	Allow light(er)	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)	D more resistant to corrosion		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(e) (i)	62.5 - 63 Allow anywhere in this range		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(e)(ii)	A description including • decreases first (1) • then increases (1)	"decreases then increases" scores 2 decreases or increases alone scores 0	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)	 (1) Propene (1)	Allow $CH_2=CH_2$ Allow prope(e)n(e) only	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	(molecule contains a) **double** bond	multiple bond(s) ignore spare bonds	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	(colour change) from orange (1) to colourless (1)	red/yellow/brown decolorised ignore clear/ discoloured	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)	**1st mark** long {molecules/ hydrocarbon / alkane/ chain} **or** break down/ decompose/ split (1) **2nd mark** into smaller {molecules / alkane / alkene / hydrocarbon/ chain} **or** more useful product		**(2)**

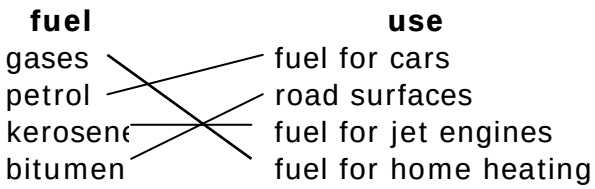
Question Number	Answer	Acceptable answers	Mark
4(d)(i)	**D** polymerisation		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(d)(ii)	An explanation linking **two** of the following • poly(ethene) does not rot/biodegrade (1) • remains for many years in landfill/ fills up land(fill) (1) • (may) harm animals / landfill unsightly (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)	An explanation linking the following • (compound of) carbon and hydrogen (1) • only (1)	Ignore C, H Do not allow mixture of carbon and hydrogen 2nd mark dependant on 1st	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)	**C** heat energy		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(c)	**fractional distillation**		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(d)	3 correct – 2 marks 1 or 2 correct – 1 mark  		**(2)**

Question Number		Indicative Content	Mark
QWC	***5(e)**	An explanation including some of the following **water** • causes condensation • damp walls etc • damages decoration • greenhouse gas/ keeps in heat **carbon dioxide** • greenhouse gas/ keeps in heat • may contribute to global warming • consequences of global warming eg flooding/ drought / crop failure / disease/ melting ice caps / climate change etc **carbon** • soot • makes things dirty/ black • damages decoration • flues or jets could be blocked • can cause breathing problems • can cause fires **carbon monoxide** • toxic (ignore harmful etc) • (also) odourless and colourless • "silent killer" • (therefore) difficult to detect • combines with haemoglobin • in red blood cells • prevents oxygen being circulated In general references to pollution, environment etc are ignored	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description (about one product) e.g. carbon monoxide is toxic because it joins to blood • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description (developed description of one product) eg carbon dioxide absorbs sun's heat and causes global warming which means ice caps melt **or** (limited description of two) e.g. carbon monoxide combines with haemoglobin so is toxic and carbon dioxide is a greenhouse gas causing global warming. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description (developed description of one and limited description of one) or (limited description of three or more) e.g. toxic carbon monoxide cannot be detected and prevents the blood from carrying oxygen so is toxic: carbon dioxide is a greenhouse gas	

		which causes global warming. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Question Number	Answer	Acceptable answers	Mark
6(a)	An explanation linking **two** of the following • suck back/ liquid into tube (1) • limewater (into test tube) (1) • as gas cools (1) • (it) contracts (1) • (test tube) {cracks/breaks} (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
6(b)	no carbon dioxide (formed) / sodium carbonate {not decomposed/ does not react} / not hot enough (for decomposition)		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(c)	C thermal decomposition		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(d)	copper carbonate → copper oxide + carbon dioxide (2)	Either product on RHS of equation = 1 Fully correct = 2	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(e)**	An explanation including some of the following **calcium carbonate / limestone** • for buildings • making roads • treating acid soil/ treating acid lakes • in power station chimneys • making cement • making concrete and mortar • making glass • extracting iron • heating (to make calcium oxide) • making sodium carbonate • as a filler in plastics and paper • in paints • toothpaste • gravestones • statues, decorative stonework • indigestion remedies • railway ballast • bread making **calcium oxide** • treating acid soil • in power station chimneys • making calcium hydroxide (when water added) **calcium hydroxide** • treating acid soil • making limewater	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description (only one product need be mentioned) e.g. limestone is used to build houses and to make cement. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description (limited mention of two products **or** more developed mention of one) e.g. limestone is used to make cement, glass and (in the manufacture of) iron where it forms slag. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description (limited mention of all three products **or** developed mention of one and limited mention of one) e.g. limestone is used for roads and to make cement: it is also heated to make calcium oxide which is used to treat acid soil. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

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Centre Number	Candidate Number

Chemistry/Science

Unit C1: Chemistry in Our World

Foundation Tier

Tuesday 5 March 2013– Morning **Time: 1 hour**	Paper Reference **5CH1F/01**

You must have: Calculator, ruler	Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P41962A

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1/1/1/1/

P 4 1 9 6 2 A 0 1 1 6

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The Periodic Table of the Elements

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	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

P 4 1 9 6 2 A 0 2 1 6
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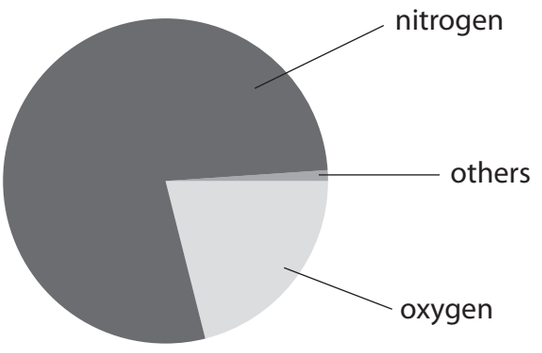
Questions begin on next page.

Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Gases in the atmosphere

1 (a) The diagram shows the gases in dry air.



(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The percentage of nitrogen in dry air is

(1)

☒ **A** 21%

☒ **B** 50%

☒ **C** 78%

☒ **D** 90%

(ii) Give the name of the gas in air that is produced by photosynthesis.

(1)

P 4 1 9 6 2 A 0 4 1 6

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(b) The early Earth was hot and its atmosphere contained a lot more water vapour than the atmosphere does now.

Explain how the amount of water vapour in the atmosphere decreased.

(2)

.....

.....

.....

(c) Some processes add carbon dioxide to the atmosphere, some remove it.

Three processes are shown in the table.

Complete the table to show the effect of each process on the amount of carbon dioxide in the atmosphere.

Put **one** tick (✓) in each row.

The first one has been done for you.

(2)

process	adds carbon dioxide	does not affect amount of carbon dioxide	removes carbon dioxide
burning fossil fuels	✓		
volcanic activity			
dissolving in the oceans			

(d) Explain why cutting down forests affects the amount of carbon dioxide in the atmosphere.

(2)

.....

.....

.....

.....

(Total for Question 1 = 8 marks)

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Limestone

2 (a) The photograph shows a limestone quarry.



Complete the sentence by putting a cross (☒) in the box next to your answer.

Opening a limestone quarry causes environmental problems.

One of these problems is that opening the quarry

(1)

- ☒ **A** provides jobs for local people
- ☒ **B** increases noise
- ☒ **C** improves the habitat for wildlife
- ☒ **D** decreases the amount of traffic

(b) Limestone is mainly calcium carbonate.

When calcium carbonate is heated, the reaction that occurs is

calcium carbonate → calcium oxide + carbon dioxide

(i) This reaction is a thermal decomposition.

Explain what is meant by **thermal decomposition**.

(2)

.....

.....

.....

P 4 1 9 6 2 A 0 6 1 6

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(ii) When 100 kg of calcium carbonate was completely decomposed, 44 kg of carbon dioxide was given off.

Calculate the mass of calcium oxide produced in the reaction.

(1)

.....

.....

mass of calcium oxide = ... kg

(c) Limestone is a sedimentary rock.
Limestone can be changed into a metamorphic rock.

(i) Give the name of a metamorphic rock formed from limestone.

(1)

.....

(ii) Explain how a sedimentary rock, such as limestone, is changed into a metamorphic rock.

(2)

.....

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.....

(iii) Sedimentary and metamorphic are two types of rock.

Give the name of the third type of rock.

(1)

.....

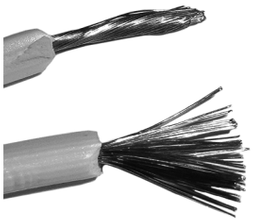
(Total for Question 2 = 8 marks)

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Metals

3 Many everyday items are made of metal.

The picture shows four objects made of metals or alloys.



electrical wire



aeroplane



jewellery



knife

(a) The electrical wire is made of copper.

Give a property of copper that makes it suitable for this use.

(1)

.....

.....

(b) Parts of aeroplanes are made of aluminium alloys instead of pure aluminium.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The aluminium alloys are used instead of pure aluminium because they

(1)

- ☒ **A** make the aeroplane heavier
- ☒ **B** corrode more easily
- ☒ **C** are more brittle
- ☒ **D** are stronger

(c) Explain why gold is a suitable metal to make jewellery.

(2)

.....

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.....

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(d) The knife is made of stainless steel.

Stainless steel is an alloy.

Explain what is meant by an **alloy**.

(2)

(e) An ore of iron contains iron oxide.

Iron is extracted from this ore.

In the extraction process, the iron oxide reacts with carbon monoxide and carbon dioxide is formed.

Write the word equation for this reaction.

(2)

(f) Iron is often recycled.

Explain an advantage of recycling iron, rather than extracting iron from iron ore.

(2)

(Total for Question 3 = 10 marks)

Acids

4 (a) (i) Hydrochloric acid is produced in the stomach.

The acid kills bacteria.

State another reason why this acid is needed in the stomach.

(1)

.....

(ii) Some people take indigestion remedies.

Why are indigestion remedies taken?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** to make bacteria grow

☒ **B** to release energy

☒ **C** to produce chlorine

☒ **D** to neutralise excess acid

(b) Dilute sulfuric acid reacts with zinc oxide.

Write the word equation for this reaction.

(2)

.....

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(c) (i) Water, with some dilute sulfuric acid added, can be decomposed by passing a direct electric current through it.

Complete the sentence by putting a cross (☒) in the box next to your answer.

This process is

(1)

☒ **A** electrolysis

☒ **B** heating

☒ **C** neutralisation

☒ **D** precipitation

(ii) The water decomposes to form hydrogen and oxygen.

Describe a test to show that a gas is hydrogen.

(2)

.....

.....

.....

.....

(d) Chlorine can be produced by the decomposition of hydrochloric acid.

(i) The decomposition is carried out in a fume cupboard.

Explain why a fume cupboard is used.

(2)

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(ii) Chlorine is used to make some polymers.

Give the name of a polymer containing chlorine.

(1)

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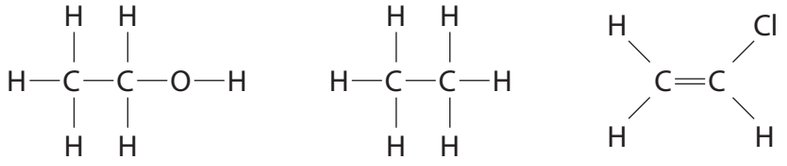
(Total for Question 4 = 10 marks)

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Crude oil

5 Crude oil is a mixture of hydrocarbons.

(a) The diagram shows a molecule of each of three substances, A, B and C.



A **B** **C**

Substance B is a hydrocarbon.

Substances A and C are not hydrocarbons.

Explain why substance B is a **hydrocarbon**.

(2)

.....

.....

.....

.....

(b) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Octane obtained from crude oil can be used as a fuel.

It is a useful fuel because it

(1)

☒ **A** is colourless

☒ **B** is not flammable

☒ **C** produces a lot of ash

☒ **D** burns to produce heat energy

(ii) The complete combustion of octane produces carbon dioxide and one other product.

Write the word equation for this reaction.

(2)

.....

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(iii) When a hydrocarbon is burned in a limited supply of air, a toxic gas is formed.

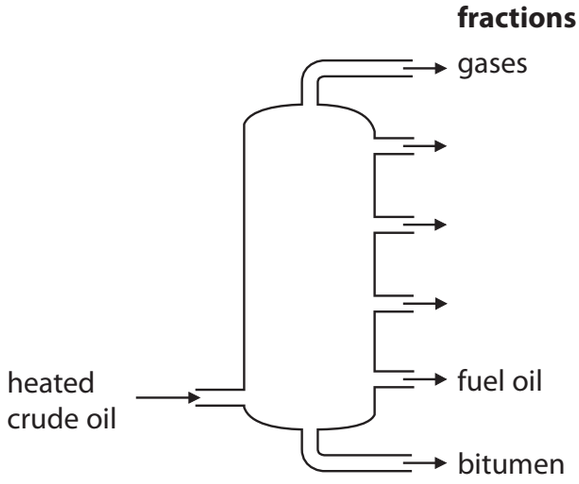
Give the name of this gas.

(1)

.....

*(c) Crude oil is separated into fractions by fractional distillation.

The diagram shows a fractional distillation tower that has been partly labelled.



Complete the identification of the fractions that are obtained from crude oil and describe uses for the six fractions.

(6)

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(Total for Question 5 = 12 marks)

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Alkanes and alkenes

6 (a) Ethane and propane are both alkanes.

Ethene and propene are both alkenes.

(i) Which of the following statements about ethene is correct?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** ethene can form a polymer

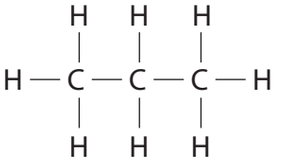
☒ **B** ethene is a saturated hydrocarbon

☒ **C** an ethene molecule has a double bond between two hydrogen atoms

☒ **D** an ethene molecule contains four carbon atoms

(ii) Complete the table:

(3)

name	formula of molecule	structure of molecule
propene	C_3H_6	
		

P 4 1 9 6 2 A 0 1 4 1 6

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(iii) Describe a test to show that a compound is an alkene rather than an alkane.

(2)

*(b) Many plastic bags are used by shoppers and then thrown away.

Most of these plastic bags are sent to landfill sites.

Two ways of reducing the amount of plastic in landfill sites are to recycle the plastic or to burn it.

Describe the possible environmental advantages and disadvantages of recycling and of burning plastics.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

March 2013

GCSE Chemistry
5CH1F/01

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Question Number	Answer	Acceptable answers	Mark
1(a)(i)	C (78%)		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	oxygen	O_2 Reject O^2, O2, O	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)	An explanation linking any **two** of • {Earth/atmosphere} cooled (1) • water vapour condensed / forms rain / forms clouds / forms precipitation (1) • {seas/ oceans} formed / soaked into ground (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)			**(2)**

process	adds carbon dioxide	does not affect amount of carbon dioxide	removes carbon dioxide
burning fossil fuels	(✓)		
volcanic activity	✓		
dissolving in the oceans			✓

Reject any row with two or more ticks; allow any symbol for tick

Question Number	Answer	Acceptable answers	Mark
1(d)	An explanation linking any **two** of EITHER • **photosynthesis** (1) • which takes in/ absorbs / removes carbon dioxide (1) OR • wood burned / wood decays (1) THERFORE • carbon dioxide increases (1)	Accept CO_2 in each case Ignore “breathes in carbon dioxide”	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)	B (increases noise)		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	An explanation linking the following • break down (of a compound) (1) • heat / high temperature (makes process happen) (1)	break up/ split up [ignore decompose]	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	56 (kg)	Accept 100-44 **if not worked out** if units given must be kg	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	Marble		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	An explanation linking • heat/high temp (1) • (high) pressure / compressed (1)	Reject if melting	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)(iii)	Igneous		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)	(good) conductor (of electricity) / flexible / malleable / ductile / unreactive	Allow explanations eg 'allows electricity to pass through'. Copper does not rust is not accepted	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)	D (are stronger)		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)	An explanation linking two of • unreactive/inert (1) • does not corrode (1) • malleable (1) • ductile (1) • scarce / valuable / expensive (1) • appropriate melting point (1) • (so stays) shiny /attractive (1)	Ignore does not rust	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)	An explanation linking • mixture of a metal (1) • with another metal or carbon (1)	Do not allow combining / bonding / joining etc instead of mixture allow specific examples	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(e)	iron oxide + carbon monoxide → iron + carbon dioxide reactants (1) products (1)	Allow fully balanced symbol equation for 2	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(f)	An explanation linking • preserves supplies (1) • as new ore not needed (1) OR • fewer quarries / mines / eyesores (1) • because ore does not have to be dug up (1) OR • iron objects last a long time (1) • so would fill up landfill sites (1) OR • because just has to be melted (1) OR • saves energy (1) • therefore less carbon dioxide released (1)	Ignore references to cost	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	break down food / (help) digestion		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	D (to neutralise excess acid)		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)	zinc oxide + sulfuric acid → zinc sulfate + water any 3 correct – 1 mark all 4 correct (and no additional substances) – 2 marks	Allow fully correct balanced equation for 2	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)(i)	A (electrolysis)		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)(ii)	A description including • lighted splint / ignite gas (1) • (squeaky) pop (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)(i)	An explanation linking • chlorine toxic / poisonous (1) • fume cupboard removes gas / OWTTE (1)	ignore harmful etc	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)(ii)	PVC / poly(chloroeth**e**ne)	Polychloroeth**e**ne / polychloreth**e**ne reject poly(chloroeth**a**ne)	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)	An explanation linking • (B) contains carbon and hydrogen (1) • only (1)	Ignore references to single or double bonds	**(2)**

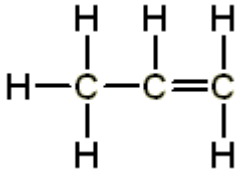
Question Number	Answer	Acceptable answers	Mark
5(b)(i)	D (burns to produce heat energy)		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(ii)	octane + oxygen → carbon dioxide + water reactants (1) products (1)	Allow fully balanced symbol equation for 2	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)(iii)	carbon monoxide	Allow CO Reject Co	**(1)**

Question Number		Indicative Content	Mark
QWC	***5(c)**	A description including some of the following points **Fractions** (in order) • (gases) • petrol / gasoline • [naphtha] • kerosene • diesel (oil) • (fuel oil) • (bitumen) **Uses** Many fractions are used as fuel gases / LPG – for camping / domestic cooking petrol – for cars kerosene - for aircraft / domestic heaters diesel oil – for cars and larger vehicles, trains fuel oil – for large ships, power stations naphtha – raw material bitumen can be used for road making and roofs / waterproofing some fractions can be cracked and alkenes used to make plastics	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. petrol, used as a fuel in cars • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. most fractions are used as fuels, including petrol in cars, kerosene in aircraft • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description e.g. most fractions are used as fuels - petrol in cars, kerosene in aircraft and diesel in lorries – and bitumen is sticky and used on road and roof surfaces • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	A (ethene can form a polymer)		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	• prop**a**ne [exact spelling](1) • C_3H_8 (1)  (1)	Allow methyl group	**(3)**

Question Number	Answer	Acceptable answers	Mark
6(a)(iii)	description including the following points • (add) bromine (water) (1) • (orange to) colourless (1)	allow decolourised / ignore discoloured, clear	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(b)**	A description including some of the following points **recycling – advantages** saves raw materials/crude oil / saves making more plastic landfill sites do not fill up as plastics non-biodegradable less possible damage to animals from discarded waste less energy used (in recycling than in starting from crude oil) **recycling – disadvantages** transport to collection area/recycling point uses fuel collection point may cause litter problem/eyesore etc plastics need to be sorted **burning – advantages and disadvantages** volume / amount of waste (bags) decreased energy released can be used landfill sites do not fill up as plastics non-biodegradable burning could produce toxic/poisonous fumes /harmful gases burning produces carbon dioxide any general comments about reducing pollution, less harm to the environment and economic issues etc can be ignored.	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. recycling is good as plastics do not rot • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. plastic bags do not rot so burning is good because it leaves little waste • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description e.g. recycling is good because it conserves oil but the plastics do have to be sorted first • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

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Surname	Other names

Centre Number | Candidate Number

Edexcel GCSE

Chemistry/Science

Unit C1: Chemistry in our World

Foundation Tier

Wednesday 7 November 2012 – Morning
Time: 1 hour

Paper Reference
5CH1F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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The Periodic Table of the Elements

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	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	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	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

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Questions begin on next page.

Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Metals

1 (a) Unreactive metals are found as uncombined metals in the Earth's crust.

Which of the following metals is found uncombined in the Earth's crust?

(1)

Put a cross (☒) in the box next to your answer.

☐ **A** gold

☐ **B** sodium

☐ **C** tin

☐ **D** zinc

(b) When iron oxide is heated with carbon, the iron oxide is reduced.

(i) Complete the word equation for the reaction.

(2)

iron oxide + carbon → ..... + ...

(ii) State what is meant by **reduced**.

(1)

.....

.....

.....

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(iii) Part of the reactivity series is shown.

sodium
aluminium
zinc
iron
copper

Aluminium is found in the ore bauxite.

Aluminium is obtained from bauxite by electrolysis.

Explain why electrolysis has to be used to obtain aluminium from bauxite.

(2)

.....

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(c) A large amount of copper in use today has come from recycling copper.

Explain the advantages of recycling metals, such as copper, rather than obtaining them from their ores.

(2)

.....

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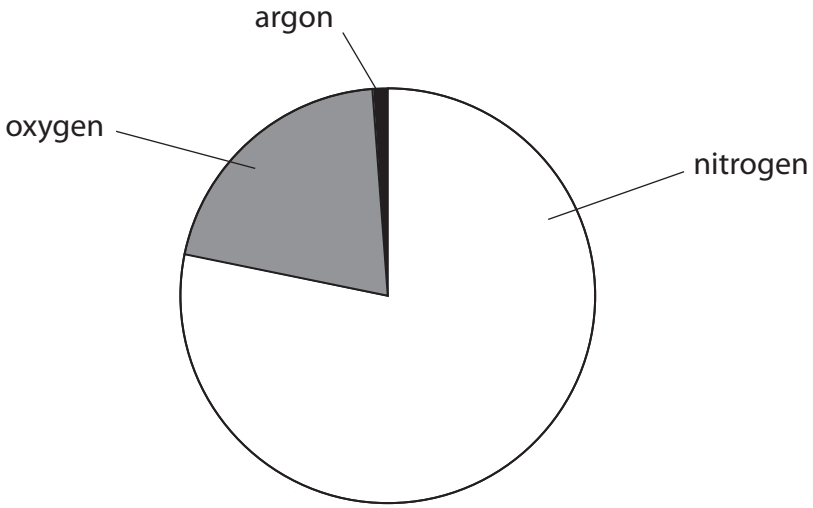
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(Total for Question 1 = 8 marks)

Oxygen

2 (a) (i) The pie chart shows the percentages of the three most abundant gases in the Earth's atmosphere today.



What is the percentage of oxygen in the atmosphere?

(1)

Put a cross (☒) in the box next to your answer.

☒ **A** 1%

☒ **B** 11%

☒ **C** 21%

☒ **D** 71%

(ii) There was very little oxygen in the Earth's early atmosphere.

Which of the following caused the amount of oxygen to increase?

(1)

Put a cross (☒) in the box next to your answer.

☒ **A** respiration in animals

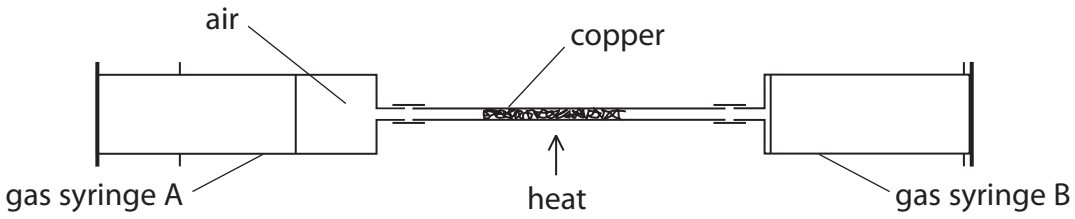
☒ **B** photosynthesis in plants

☒ **C** eruption of volcanoes

☒ **D** condensation of water vapour

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(b) The percentage of oxygen in a sample of air can be found by passing the sample of air over heated copper.



(i) State **two** safety precautions that need to be taken when carrying out this experiment.

(2)

.....

.....

.....

.....

(ii) Explain how heated copper removes oxygen from the air.

(2)

.....

.....

.....

.....

(c) Oxygen reacts with hydrogen in a fuel cell to produce energy.

(i) Give the name of the product formed when oxygen reacts with hydrogen.

(1)

.....

(ii) State **one** advantage of using a fuel cell instead of petrol to power a car.

(1)

.....

.....

.....

(Total for Question 2 = 8 marks)

Acids

3 (a) The photograph shows bottles of some concentrated acids.



(i) There are hazard symbols on the bottles.

State why hazard symbols are used.

(1)

.....

.....

(ii) This hazard symbol is on all the bottles of concentrated acid.



State the meaning of this symbol.

(1)

.....

.....

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(b) Which of these substances neutralises dilute hydrochloric acid?

Put a cross (☒) in the box next to your answer.

(1)

- ☒ **A** potassium chloride
- ☒ **B** potassium hydroxide
- ☒ **C** potassium nitrate
- ☒ **D** potassium sulfate

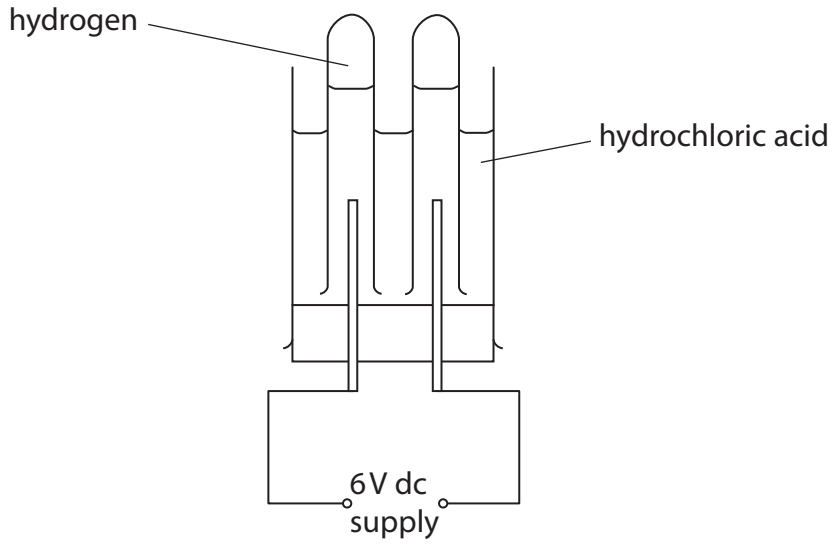
(c) Which of these substances is produced when sodium carbonate reacts with dilute sulfuric acid?

Put a cross (☒) in the box next to your answer.

(1)

- ☒ **A** sodium chloride
- ☒ **B** sodium hydroxide
- ☒ **C** sodium nitrate
- ☒ **D** sodium sulfate

(d) The electrolysis of hydrochloric acid can be carried out using this apparatus.



(i) Explain what is meant by the term **electrolysis**.

(2)

.....

.....

.....

.....

(ii) Hydrogen is formed at one electrode.

Name the gas formed at the other electrode.

(1)

.....

(iii) Describe the test to show a gas is hydrogen.

(2)

.....

.....

.....

.....

(e) When water is electrolysed, hydrogen is also formed at one electrode.

Give the name of the gas formed at the other electrode.

(1)

.....

(Total for Question 3 = 10 marks)

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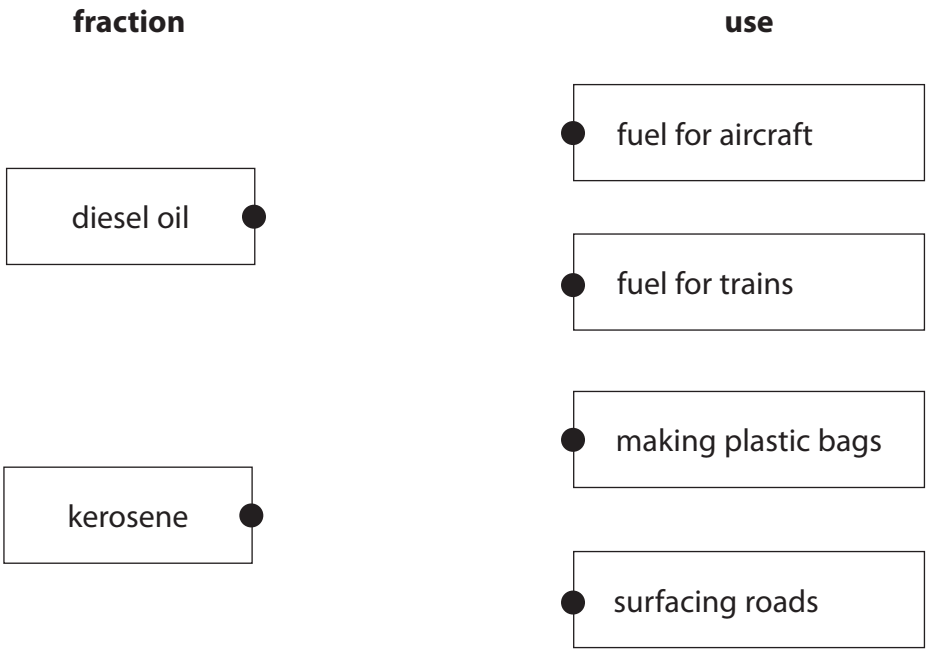
Hydrocarbons

4 (a) Crude oil is separated into useful fractions by fractional distillation.

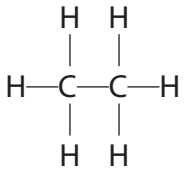
Diesel oil and kerosene are two of these fractions.

Draw **one** straight line from each of these fractions to a use of the fraction.

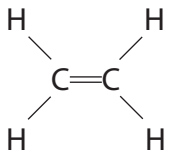
(2)



(b) Molecules of two compounds **W** and **X** are shown.



molecule of compound **W**



molecule of compound **X**

(i) Compound **W** is an alkane.

Explain what is meant by the term **alkane**.

(2)

.....

.....

.....

.....

(ii) Compound **X** is an alkene.

Give the name of compound **X**.

(1)

.....

(iii) Describe what you would **see** when bromine water is shaken with separate samples of compound **W** and compound **X**.

(2)

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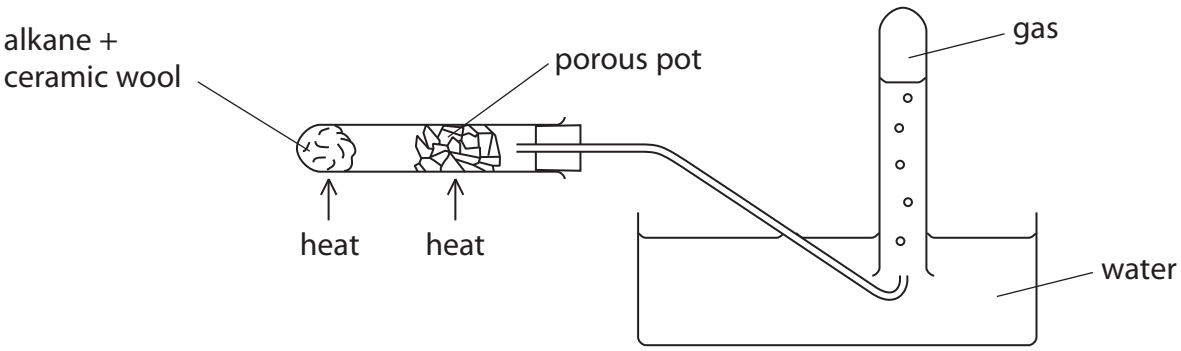
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(c) This apparatus is used to break down large alkane molecules into smaller alkane and alkene molecules.



What is the name of the process taking place in this apparatus?

Put a cross (☒) in the box next to your answer.

(1)

- ☒ **A** burning
- ☒ **B** cracking
- ☒ **C** distillation
- ☒ **D** polymerisation

(d) Alkenes are used to make polymers such as poly(propene).

Uses of polymers depend on the properties of polymers.

Explain how a use of poly(propene) depends on one of its properties.

(2)

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(Total for Question 4 = 10 marks)

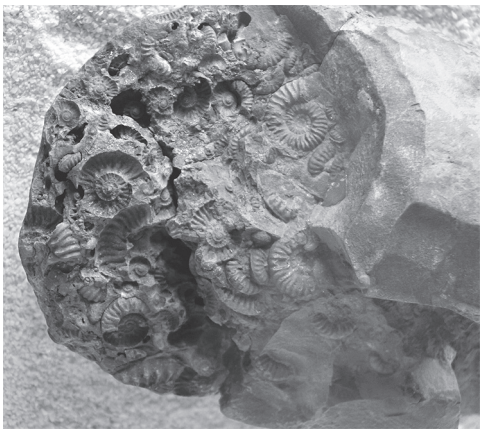
Limestone

5 Limestone is a sedimentary rock.

(a) Explain how sedimentary rocks are formed.

(2)

(b) The photograph shows a piece of limestone.



State what can be seen in this photograph that shows limestone is likely to be a sedimentary rock.

(1)

(c) Limestone contains calcium carbonate.

Farmers spread powdered limestone on their fields.

State why limestone is spread on fields.

(1)

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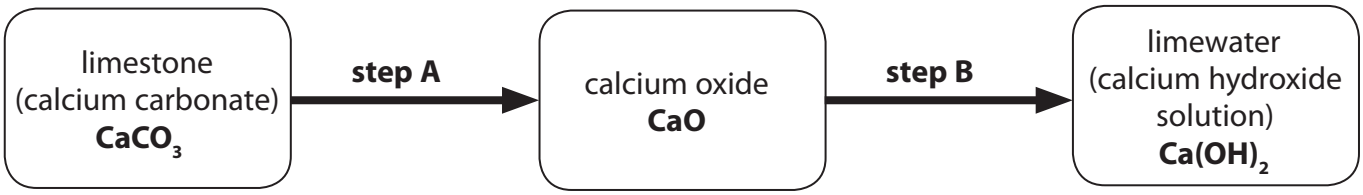
(d) Marble can be formed from limestone.

Marble is a metamorphic rock.

Describe the conditions needed for limestone to change into marble.

(2)

*(e) Limestone can be converted into limewater in two steps as shown in the diagram.



Describe how limestone is converted into limewater in the laboratory, using these reactions.

(6)

(Total for Question 5 = 12 marks)

The changing atmosphere

6 (a) (i) The composition of the atmosphere changes when fossil fuels are burned in air.

When methane undergoes complete combustion carbon dioxide and water are formed.

Write the word equation for the complete combustion of methane.

(2)

.....

(ii) Incomplete combustion of methane can produce carbon and carbon monoxide.

Describe some of the problems caused by these products.

(2)

.....

.....

.....

.....

(b) Describe how impurities in fossil fuels result in the formation of acid rain.

(2)

.....

.....

.....

.....

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*(c) Some processes release carbon dioxide into the atmosphere and other processes remove it.

Describe some natural processes and human activities that release carbon dioxide and some that remove it.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

November 2012

GCSE Chemistry
5CH1F/01

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GCSE Chemistry 5CH1F/01 Mark Scheme – November 2012

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	A gold		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	carbon dioxide (1) iron (1)	carbon monoxide	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	loss of oxygen / oxygen is removed	gain of electrons ignore oxide removal	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(iii)	An explanation linking two of aluminium is high in reactivity (1) aluminium oxide is stable (1) (needs) powerful means (of reduction) / hard to extract (1) use electricity (1) aluminium not reduced by carbon (1)	Allow higher than carbon carbon is not reactive enough accept other (cheaper) methods if qualified.	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)	An explanation linking two of conserves {resources/ores} (1) reduces waste material (from extraction) (1) less damage to landscape / habitats (1) reduces landfill (1) less {copper/metal} goes to waste (1)	will not run out of metals / copper accept cost/energy/pollution only if qualified (1) e.g. less energy to recycle than to extract from ore	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	C 21%		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	B photosynthesis in plants		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	Any two from take care with heating/Bunsen burner (1) wear eye protection (1) wear lab coat (1) wear gloves (1) wear mask (1)	 tie long hair back ignore basic lab rules e.g. stand back, behave sensibly, don't throw things	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	An explanation linking copper reacts with oxygen (1) to form copper oxide (1)	oxidation / oxidises copper + oxygen → copper oxide lhs (1) rhs (1) ignore absorbs ignore air	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	water	allow hydrogen oxide ignore H_2O reject hydroxide	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	Any one of the following points **only** produces water (1) does not produce carbon dioxide (1) water is harmless (1) conserves reserves of crude oil/fossil fuels (1) hydrogen is a renewable fuel/ora (1)	 less / no pollution reject less carbon dioxide ignore hydrogen can be reused ignore reference to cost	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	to warn (of danger) / internationally recognised / so the correct precautions can be taken (1)	for people who cannot read / to show the acids are corrosive	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	corrosive	corrosion possible cq from (ai) ignore harmful / irritant / burns	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)	B potassium hydroxide		**(1)**

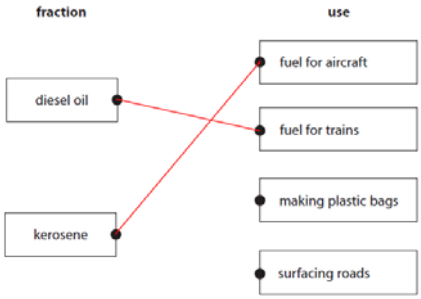
Question Number	Answer	Acceptable answers	Mark
3(c)	D sodium sulfate		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(d)(i)	An explanation linking decomposing / breaking down of (compounds/substances) (1) using electrical energy / electricity /d.c. (1)	 splitting up ignore separate	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)(ii)	chlorine	reject chloride ignore Cl_2	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(d)(iii)	A description including use of lighted splint (1) hydrogen burns / (mixture of air and hydrogen) gives a 'pop' (1)	 pop test for 1 mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(e)	oxygen	reject oxide ignore O_2	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)	 Each correct line – 1 mark If more than one line drawn from a 'fraction' box, the 0 marks for that fraction diesel oil linked to fuel for trains (1) kerosene linked to fuel for aircraft (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	An explanation linking two of hydrocarbon (1) saturated (1) {all / only} single bonds / no multiple bonds / carbon carbon bonds are single (1)	a compound containing {carbon / C} and {hydrogen / H} **only** (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	ethene	reject eth**a**ne ignore C_2H_4	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(iii)	A description including (stays) orange with {W / alkane / ethane} (1) (turns) colourless with {X / alkene / ethene} (1)	does not change ignore clear ignore discolour if colour given for bromine water, accept brown/orange/yellow.	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)	B cracking		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(d)	An explanation linking suitable use (1) related property (1)	Second mark is dependant on the first examples use: buckets / bowls (1) property: rigid / strong / shatterproof / waterproof(1) OR use: carpets / ropes /clothing (1) property: made into fibres / hard wearing / flexible(1) OR use: packaging / bags (1) property: strong / lightweight / non-toxic / waterproof (1) OR use: medical equipment (1) property: because it can be sterilised (without melting) (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)	An explanation linking two of layers / deposits of (1) sediment/sand/rock/dead (sea) creatures (1) (sediment is) {squashed/crushed/compacted / pressurised} (1) over (a long period of) time (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)	(presence of) fossils (1)	imprints ignore shells	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(c)	{neutralise / react / remove} acid / soil is acidic	increase pH neutralise soil	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(d)	A description including heat / high temperature (1) (high) pressure / compressed (1)	Ignore melting	**(2)**

Question Number		Indicative Content	Mark
QWC	***5(e)(i)**	A description including some of the following **Step A** heat limestone strong heat / with roaring Bunsen flame thermally decompose limestone to form calcium oxide and carbon dioxide allow to cool word eqn: calcium carbonate → calcium oxide + carbon dioxide bal eqn: $CaCO_3 \rightarrow CaO + CO_2$ **Step B** add water to calcium oxide calcium oxide swells/cracks/steams until in excess white solid dissolves in water filter mixture to remove unreacted calcium hydroxide colourless solution formed word eqn: calcium oxide + water → calcium hydroxide bal eqn: $CaO + H_2O \rightarrow Ca(OH)_2$	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	a limited description e.g. strongly heat limestone the answer communicates ideas using simple language and uses limited scientific terminology spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	a simple description e.g. strongly heat limestone, then add water to the calcium oxide the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	a detailed description e.g. strongly heat limestone, carbon dioxide evolved, add water to the calcium oxide, colourless solution formed the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
6(a)(i)	methane + oxygen → carbon dioxide + water lhs (1) rhs (1)	correct formulae in balanced or unbalanced equation (1) ignore heat	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	A description including two of carbon is soot (1) carbon makes things dirty(1) carbon damages lungs (1) carbon monoxide is toxic / poisonous (1) carbon monoxide reduces the amount of oxygen that can be carried by the blood (1) combines with haemoglobin / red blood cells (1)	kills people /makes people ill	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(b)	A description including two of sulfur (impurities) (1) burn in {air / oxygen} (1) form sulfur dioxide / acidic fumes (1) dissolves in rain water (1)	Fossil fuels burn in {air / oxygen} (1) ignore references to carbon dioxide	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(c)**	A description including some of the following processes releasing carbon dioxide burning fuels containing carbon / carbon in fuel reacts with oxygen in air respiration / sugars react with oxygen volcanic activity / one of gases produced when volcano explodes manufacturing processes producing gas decay of vegetable matter deforestation qualified processes removing carbon dioxide carbon dioxide is soluble dissolving in oceans incorporated into marine organisms forming carbonate rocks photosynthesis plants absorb carbon dioxide iron seeding fertilize and grow algae carbon dioxide capture conversion into hydrocarbons	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	a limited description e.g. burning fossil fuels and respiration release carbon dioxide the answer communicates ideas using simple language and uses limited scientific terminology spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	a simple description e.g. carbon dioxide soluble in water dissolves in oceans and rain water, photosynthesis uses carbon dioxide for green plants to grow the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	a detailed description e.g. burning fossil fuels and respiration release carbon dioxide and photosynthesis uses carbon dioxide for green plants to grow the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately spelling, punctuation and grammar are used with few errors	

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Edexcel GCSE

Centre Number	Candidate Number

Chemistry/Science

Unit C1: Chemistry in Our World

Foundation Tier

Monday 21 May 2012 – Morning **Time: 1 hour**	Paper Reference **5CH1F/01**

You must have: Calculator, ruler	Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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The Periodic Table of the Elements

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	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

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Questions begin on next page.

Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Iron

1 Iron occurs in the Earth's crust as an ore.



iron ore

The ore is mainly iron oxide, Fe_2O_3.

(a) Give the name of the element combined with iron in iron oxide.

(1)

.....

(b) When iron oxide is heated with carbon, the products are iron and carbon dioxide.

(i) Complete the word equation for this reaction.

(2)

iron oxide + ... → iron + ...

(ii) What happens to the iron oxide during this reaction?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** the iron oxide burns

☒ **B** the iron oxide is neutralised

☒ **C** the iron oxide is oxidised

☒ **D** the iron oxide is reduced

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(c) Iron corrodes when it is left in moist air.

This list shows iron and three other metals in reactivity series order, with the most reactive metal at the top.

most reactive	magnesium
	iron
	lead
least reactive	silver

Explain which metal in the list will corrode faster than iron.

(2)

.....

.....

.....

.....

(d) Stainless steel is an alloy containing iron and chromium.

(i) State the meaning of the term **alloy**.

(1)

.....

.....

(ii) Cutlery is made of stainless steel.

Give a reason why cutlery is not made of pure iron.

(1)

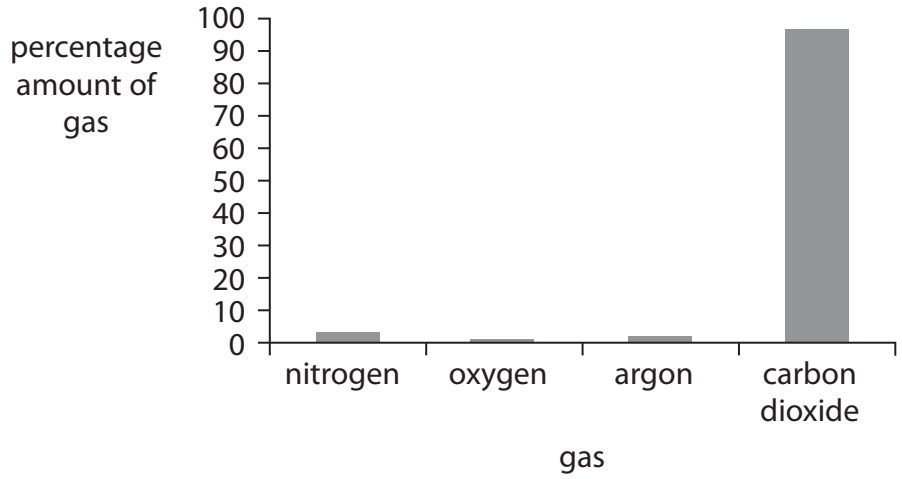
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(Total for Question 1 = 8 marks)

The Earth's atmosphere

2 The amounts of some gases in the Earth's early atmosphere are shown on the bar chart.



(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

The earth's earliest atmosphere was formed by

(1)

☒ **A** animals breathing

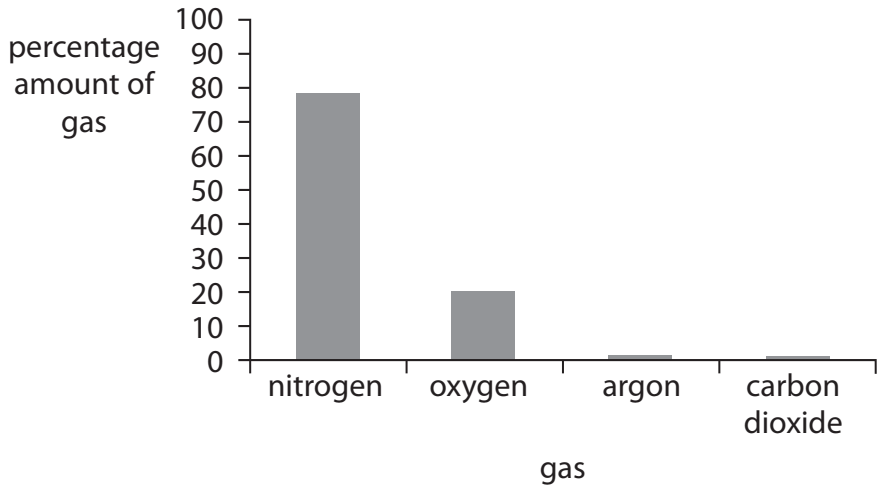
☒ **B** trees burning

☒ **C** plants photosynthesising

☒ **D** volcanoes erupting

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(b) The amounts of some gases in the atmosphere on Earth today are shown on this bar chart.



Which gas has decreased by the largest amount from the Earth's early atmosphere to the atmosphere of the Earth today?

Use this bar chart and the bar chart in (a).

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** argon

☒ **B** carbon dioxide

☒ **C** nitrogen

☒ **D** oxygen

(c) There was also a large amount of water vapour in the Earth's early atmosphere. There is a much smaller amount of water vapour in the atmosphere on Earth today.

Explain how the amount of water in the Earth's atmosphere decreased.

(2)

(d) Methane burns in air.

$$\text{methane} + \text{oxygen} \rightarrow \text{carbon dioxide} + \text{water}$$

This causes small changes in the amounts of some gases in today's atmosphere.

Explain why burning methane changes the amounts of gases in the atmosphere.

(2)

(e) Apart from burning fossil fuels, state **two** other activities that affect the amounts of gases in the atmosphere.

(2)

(Total for Question 2 = 8 marks)

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Hydrochloric acid

3 (a) Dilute hydrochloric acid can be used to make salts.
The salts produced are chlorides.

Some copper compounds react with dilute hydrochloric acid to produce copper chloride.

Which of the following compounds will **not** neutralise dilute hydrochloric acid to produce copper chloride?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** copper carbonate

☒ **B** copper hydroxide

☒ **C** copper oxide

☒ **D** copper sulfate

(b) Use words from the box to complete the word equation for the reaction of magnesium carbonate to produce magnesium chloride.

(2)

carbon dioxide	hydrochloric acid	nitric acid
oxygen	sulphuric acid	

magnesium carbonate + ... → magnesium chloride + ... + water

(c) Indigestion tablets neutralise excess hydrochloric acid in the stomach.
Two tablets, A and B, were tested.

The table shows the cost of each tablet and the volume of hydrochloric acid neutralised by each tablet.

tablet	cost of one tablet / p	volume of hydrochloric acid neutralised by one tablet / cm^3
A	2.5	30.6
B	1.2	10.2

Explain which tablet, A or B, is the best value for money.

(2)

.....

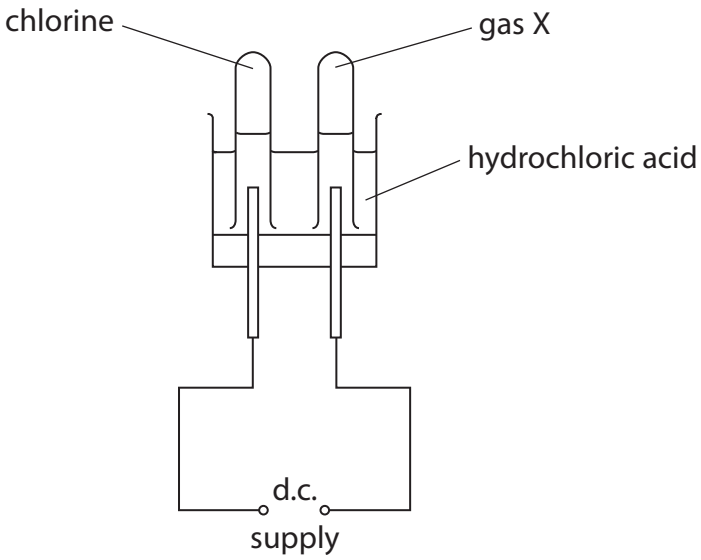
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(d) Hydrochloric acid was electrolysed using the apparatus shown.



(i) Chlorine gas was collected in one of the test tubes.

Describe a test to show the gas is chlorine.

(2)

.....

.....

.....

.....

(ii) Gas X was collected in the other test tube.
When gas X was mixed with air and ignited, it burned with a squeaky pop.

Give the name of gas X.

(1)

.....

(e) In industry, large amounts of chlorine are produced.

Explain why it could be dangerous to produce large amounts of chlorine in a factory.

(2)

.....

.....

(Total for Question 3 = 10 marks)

Fuels

4 Different car engines are designed to use different fuels.
These fuels include diesel, ethanol, hydrogen, LPG (liquefied petroleum gas) and petrol.

(a) LPG contains the compound propane.

(i) Complete the structure of a molecule of propane, C_3H_8, showing all bonds.

(1)

C——C——C

(ii) Propane burns completely to produce carbon dioxide and water.

Describe how you would use limewater to show that carbon dioxide is produced.

(2)

.....

.....

.....

.....

(iii) Incomplete combustion occurs when propane burns with insufficient oxygen available for complete combustion.

Explain a problem caused by the products of this incomplete combustion.

(2)

.....

.....

.....

.....

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(b) Biofuels can be used as alternatives to non-renewable, fossil fuels.

(i) Which of the following can be produced as a biofuel?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** ethanol

☒ **B** hydrogen

☒ **C** LPG

☒ **D** petrol

(ii) Explain how a biofuel is different from a fossil fuel.

(2)

.....

.....

.....

.....

(c) The table shows information about two fuels, A and B, used in car engines.

fuel	physical state	cost of 1 kg / £	energy produced by complete combustion of 1 kg / MJ	availability at fuel station
A	gas	2.13	142	limited
B	liquid	1.95	47	good

Explain which fuel, A or B, would be best for powering a car.

(2)

.....

.....

.....

.....

(Total for Question 4 = 10 marks)

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Calcium carbonate

5 (a) Limestone is a rock which often contains fossils.



What type of rock is limestone?

Put a cross (☒) in the box next to your answer.

(1)

- ☒ **A** igneous
- ☒ **B** lava
- ☒ **C** metamorphic
- ☒ **D** sedimentary

(b) Limestone is an important raw material.

Which of these is made using limestone as a raw material?

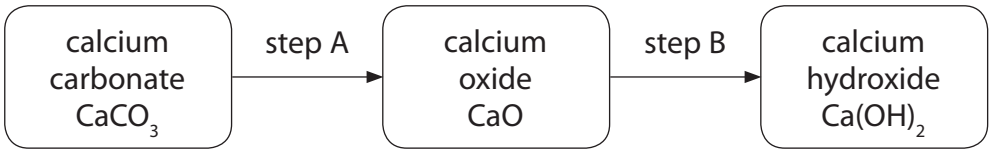
Put a cross (☒) in the box next to your answer.

(1)

- ☒ **A** bleach solution
- ☒ **B** cement
- ☒ **C** fertilisers
- ☒ **D** soap

(c) Limestone contains calcium carbonate.

Calcium carbonate can be converted into calcium oxide.
Calcium oxide can then be converted into calcium hydroxide.



(i) A lump of calcium carbonate is heated to convert it into calcium oxide in step A.

Explain why the mass of calcium oxide formed is less than the original mass of calcium carbonate.

(2)

.....

.....

.....

.....

(ii) Write the word equation for the reaction in step B.

(2)

.....

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*(d) Even though limestone is an important raw material in the chemical industry, many people are against plans to open new limestone quarries.

Discuss the advantages and disadvantages, to the local community and its surroundings, of opening a new limestone quarry.

(6)

(Total for Question 5 = 12 marks)

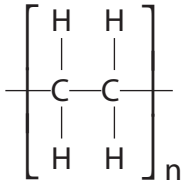
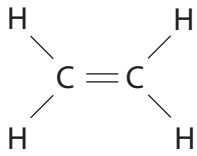
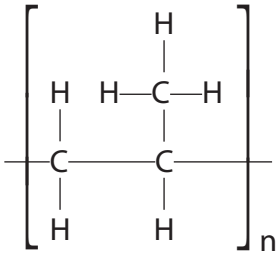
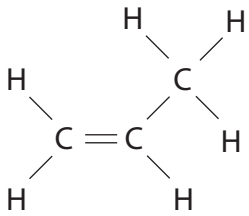
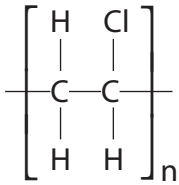
Polymers

6 Polymer molecules are made by joining large numbers of small molecules (monomers) together.

(a) The table shows some information about three polymers and the monomers used to make them.

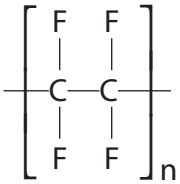
Complete the table.

(3)

name of polymer	structure of polymer molecule	name of the monomer used to make the polymer molecule	structure of monomer molecule
poly(ethene)		.....	
.....		propene	
poly(chloroethene)		chloroethene	.....

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(b) The structure of the polymer poly(tetrafluoroethene), PTFE, is



State why this polymer is **not** a hydrocarbon.

(1)

.....

.....

(c) Poly(chloroethene), PVC, is used to make gutters and drainpipes.



One property of poly(chloroethene) is that it is easy to shape.

Describe other properties of poly(chloroethene) that make it suitable for gutters and drainpipes.

(2)

.....

.....

.....

.....

*(d) Waste is often disposed of by putting it in landfill sites, by burning or by recycling.

Discuss the advantages and disadvantages of each disposal method, and explain which disposal method should be used for plastic bottles.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

Summer 2012

GCSE Chemistry
5CH1F/01

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GCSE Chemistry 5CH1F/01 Mark Scheme – Summer 2012

Question Number	Answer	Acceptable answers	Mark
1(a)	oxygen	**Ignore** iron **Reject** oxide, O, O_2 or O_3	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	iron oxide + carbon (1) → iron + carbon dioxide(1)	iron oxide + C (1) → iron + CO_2 (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	**D** the iron oxide is reduced		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)	An explanation linking the following points • magnesium (1) • it is more reactive (than iron) / it is {higher (than iron)/highest/first/top} in the reactivity series (1)	**Allow** {highest / first / top /most reactive /higher than iron} (in the list) (1) **Allow** it reacts faster with {air/water/oxygen/other substances} (than iron) (1) **Allow** more things react with it (1) **Allow** 2nd marking point if a more reactive metal is chosen that is not in the list (1) **Ignore** it is high in the reactivity series **Ignore** it is reactive **Do not allow** 2nd marking point if chosen metal is less reactive than iron	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(d)(i)	Any one from {mixture of / contains / made from / formed from / addition of } **AND** {metals / metal and non-metal / metal and another element / metal and carbon / iron and another metal	**Reject** any mention of **compound** of metals etc **Ignore** metals etc combined/joined together **Ignore** combination of metals etc **Allow** put one metal into another **Allow** metals melted together	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(d)(ii)	Any one from iron/ it • rusts / corrodes • is soft / is not strong enough / is too flexible / is too weak • {bends/breaks/snaps} easily • reacts with {air / oxygen / water / food}	**Ignore** additional correct answers **Do not award the mark** if additional **incorrect** answers **Allow** iron would stain **Allow** (stainless) steel {is **stronger** than iron / does not rust **as quickly**} **Ignore** just 'stainless steel does not rust/corrode or react with {air/oxygen/water / food}'	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)	**D** volcanoes erupting		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)	**B** carbon dioxide		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)	An explanation linking **two** of the following points • Earth cooled (1) • {water (vapour) / steam} condensed (1) • {seas / oceans / rivers / lakes} formed (1)	**Allow** the Earth was warmer when the early atmosphere formed (1) **Allow** water (vapour) / steam turned into rain (1) **Allow** water vapour / steam turned into water (1) **Ignore** photosynthesis uses water	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(d)	An explanation linking **two** of the following points • amount of oxygen decreases / methane {uses / reacts with / combines with} oxygen (1) • amount of carbon dioxide increases / {produces /forms /makes/lets out/gives off /releases} carbon dioxide(1) • amount of water (vapour) increases / {produces /forms /makes/lets out/gives off /releases} water (vapour) (1)	**Ignore** references to other gases **Ignore** changes the amounts of gases	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(e)	Any **two** from the following points • farming / animals release methane (1) • deforestation / cutting down trees (1) • burning anything that is not a fossil fuel eg wood / rubbish / waste / plastic (1) • living things {breathing / respiration / taking in oxygen and releasing carbon dioxide} (1) • plants {photosynthesising / taking in carbon dioxide and releasing oxygen} (1) • {plants / animals} {decaying / decomposing} (1) • rotting waste (in landfill) (1) • processing limestone (1)	**Ignore** additional correct answers **Penalise** additional **incorrect** answers **Ignore** acid rain / cars / planes / pollution / global warming /factories / quarries / power plants **Ignore** just 'human activities' unless specified **Allow** volcanoes (erupting) (1) **Allow** gases dissolving in oceans (1) **Allow** iron seeding (1) **Allow** people smoking / use of aerosol sprays (1) **Allow** growing crops (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(a)	**D** copper sulfate		**(1)**

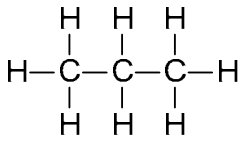
Question Number	Answer	Acceptable answers	Mark
3(b)	(i) hydrochloric acid (1) (ii) carbon dioxide (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)	An explanation linking the following points **First marking point** tablet chosen with any one correct qualitative statement tablet A • because it neutralises more acid (than B) (1) OR tablet B • because it is cheaper (than A) (1) **Second marking point** any one correct quantitative statement **eg.** • need {3/more than 2} tablets of B to neutralise the same amount of acid as A (1) • tablet A neutralises {three/more than two} times as much acid as B (1) • it costs 3.6 p of B to neutralise the same amount of acid as {1 tablet/2.5p} of A (1) Tablet A costs twice as much as tablet B but neutralises three times as much acid scores 2 marks	**Allow** answers based on analysis of numbers, e.g. tablet A because 1p of tablet A neutralises 12.24 cm^3 of acid (1) 1p of tablet B neutralises 8.5 cm^3 of acid (1) **Allow** A neutralises more acid than B for the (same) amount of money (2) **Ignore** just A is more effective **Allow** it costs 0.08p to neutralise 1 cm^3 of acid with tablet A (1) it costs 0.12p to neutralise 1 cm^3 of acid with tablet B (1) **Ignore** A neutralises acid **faster** than B **Ignore** money units eg. pounds instead of pence **Reject** A **contains** more acid than B	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)(i)	A description including the following points • (damp blue or red) litmus (1) • turns (red then) white / bleached (1)	**Allow** use of any suitable indicator **(1)** with correct result (1) e.g. universal indicator is bleached (2) starch iodide paper turns blue/black (2) **Allow** bleaches indicator (1) **Ignore** indicator gets lighter **Ignore** any incorrect middle colour mentioned **Reject** goes clear **Ignore** smells of swimming pools (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(d)(ii)	hydrogen	**Allow** H_2 **Reject** H, 2H, H2, H^2	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(e)	A description including **two** of the following points • chlorine could leak out (1) • (it is) toxic / poisonous / irritant / corrosive (1) • an effect on **people** eg. death / injury / burn skin / damage lungs / bad for you if breathed in / make you ill / {irritates/damages} eyes (1)	**Ignore** just 'chlorine is dangerous' **Ignore** other effects eg. flammable / explosive **Allow {**harms / harmful} to people	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(i)		**Allow** h for H **Reject** an extra bond (=) between any of the carbon atoms	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	A description including the following points **First marking point** an active mixing of carbon dioxide with limewater eg. {bubble /pass gas through / put gas into /add gas to /mix gas with /shake gas with} limewater (1) **Second marking point** how the limewater changes milky/cloudy/white (precipitate) (1)	**Reject** blow through a straw **Reject heat** the limewater **Allow** pass gas etc through the water (1) **Allow** '{the water/it} turns milky/cloudy/white (precipitate)' (1) **Do not allow** changes colour **Do not allow** this mark if an incorrect gas/reagent is used	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(iii)	**Both marks must come from the same pair only, not one from each pair** An explanation linking **one** of the following pairs **EITHER** • carbon monoxide formed (1) • toxic /poisonous /can {kill / harm/suffocate} people /is {fatal /lethal} /restricts the amount of oxygen carried by the blood (1) **OR** • smoke/soot formed (1) • damages lungs /chokes people /makes things dirty (1)	Ignore additional answers **Ignore** dangerous **Allow** the second mark if an incorrect gas is stated eg methane (1) **Allow** less energy released (1) **Allow** blocks fuel jets (1) **Allow** less energy released (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	**A** ethanol		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	An explanation linking **two** of the following points • biofuels are {renewable /will not run out} / fossil fuels are {non-renewable / will (eventually) run out} (1) • biofuels can be obtained from {plants / animals /animal droppings} (1) • biofuels are produced more quickly (than fossil fuels) / fossil fuels take longer to produce (than biofuels) (1) • fossil fuels are used faster than being formed / finite resource (1) • fossil fuels are extracted from crude oil (1)	**Ignore** additional answers **Allow** 'it' or 'they' for 'biofuels' **Allow** biofuels have a lower carbon footprint / use carbon dioxide whilst growing / are carbon neutral (1) **Allow** biofuels contain biological material/made from living things **Ignore** biofuels can be reused **Ignore** releases less carbon dioxide **Ignore** biodegradable **Ignore** coal is a fossil fuel	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)	**Both marks must come from the same pair only, not one from each pair** **If no comparison is made, maximum is 1 mark** An explanation linking **a chosen fuel** to **two** of the following points fuel A • higher energy (per kg of fuel) / B produces less energy (1) • but {higher cost /only costs 18 p more /limited availability /difficulty in storing gas} (1) **OR** fuel B • is a liquid so easier to {handle/ store/transfer} (1) • cheaper (1) • greater availability (1)	If both fuels are discussed, select the fuel that gives the higher mark. **Allow** more energy per £/cost (2)	**(2)**

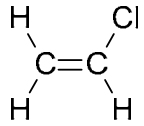
Question Number	Answer	Acceptable answers	Mark
5(a)	**D** sedimentary		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)	**B** cement		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(c)(i)	An explanation including **two** of the following points • (calcium carbonate) decomposes / breaks down (1) • carbon dioxide / CO_2 (1) • {gas/carbon and two oxygen atoms} {escapes /is lost /given off /released / removed /produced/made} (1)	**Ignore** burning **Allow** O has less mass than CO_3 (1) **Allow** oxygen gas escapes etc (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(c)(ii)	calcium oxide + water (1) → calcium hydroxide (1) the '+' and '→' must be present for 2 marks, but allow = for → LHS (1) RHS (1) Do not allow these marks if additional reactants and/or products are included	**Allow** $CaO + H_2O$ (1) → $Ca(OH)_2$ (1) **Allow** a mixture of words and correct formulae If words and formulae are given, ignore formulae **Ignore** heat	**(2)**

Question Number		Indicative Content	Mark
QWC	***5 (d)**	A discussion including some of the following points **Advantages** • quarrying creates new jobs • benefits the local economy/community • limestone is useful as a building material / neutralising acid soils / removing acid gases from power station chimneys /making iron etc • {calcium oxide / lime or calcium hydroxide / slaked lime} can be made from it and used to neutralise acid soils • limestone can be made into other useful substances eg cement / concrete / glass • educational visits **Do not allow** just 'limestone is a raw material for the chemical industry' as this is in the question **Disadvantages** • quarrying scars the landscape/is an eyesore/ruins the view/is ugly • quarrying takes a lot of land • quarrying destroys the habitats of birds / animals • quarrying is noisy • quarrying creates dust • the dust can cause health problems (asthma/breathing difficulties) • there will be extra traffic / lorries on local roads • house prices will be reduced • less tourism	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. creates jobs • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. creates jobs but spoils the landscape / damages the landscape and creates dust • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description e.g. creates jobs which benefits the local community but there will be extra traffic which is noisy • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
6(a)	ethene (1) poly(propene) (1)  (1)	 **Allow** polypropene (1) **Reject** 'h' 'cl' 'CL' 'cL' **Reject** 5 bonds on either C **Ignore** bond angles	 **(3)**

Question Number	Answer	Acceptable answers	Mark
6(b)	Any one from • does not contain hydrogen • only carbon and fluorine present • has fluorine instead of hydrogen • it does not contain carbon and hydrogen only	**Ignore** molecules / particles **Allow** hydrocarbons contain carbon and hydrogen only	 **(1)**

Question Number	Answer	Acceptable answers	Mark
6(c)	A description including **two** of the following points • rigid (1) • tough / strong / does not break easily (1) • long-lasting / durable / hardwearing (1) • does not {rot / corrode} / non-biodegradable(1) • light(weight) / low density (1) • insoluble / waterproof / water resistant / does not react with {water/any substance} / is unreactive (1)	**Ignore** additional answers **Ignore** cheap / malleable **Allow** is smooth so {water can run along easily / harder to block} (1) **Allow** does not rust (1)	 **(2)**

Question Number		Indicative Content	Mark
QWC	***6 (d)**	A discussion including some of the following points **Landfill** Advantages • requires no processing / easy to do • (almost) all waste can be sent to landfill Disadvantages • uses valuable land • loss of animal habitats • polymers do not rot • smell • attracts {vermin /gulls} • releases gases (as the waste rots) **Burning** Advantages • produces useful energy • solves the problem of landfill • quicker than rotting in landfill Disadvantages • produces harmful / toxic products / named gas eg. carbon dioxide, carbon monoxide, hydrogen cyanide **Recycling** Advantages • reuses the polymer /bottle • makes new articles e.g. insulation blocks • solves the problems of landfill and burning • conserves natural resources Disadvantages • difficult to sort and clean • uses energy • coloured plastics have limited new uses • not all items can be recycled • requires public cooperation Disadvantage of any one of the methods • extra traffic / lorries / noise **Explanation of disposal method** • statement of chosen method of disposal	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited discussion e.g. bottles do not rot / recycling is the best method for disposing of plastic bottles • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple discussion e.g. bottles do not rot and produce toxic products when burnt, recycling is best • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed discussion e.g. landfill uses valuable land, burning produces useful energy, recycling reuses the material and is best method of disposing of bottles • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

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Edexcel GCSE

Centre Number	Candidate Number

Chemistry/Science

Unit C1: Chemistry in our World

Foundation Tier

Thursday 1 March 2012 – Morning **Time: 1 hour**	Paper Reference **5CH1F/01**

You must have: Calculator, ruler	Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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The Periodic Table of the Elements

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	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

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Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Metals

1 Most metals occur as compounds found in rocks.
Metals can be extracted from some of these rocks.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

Rocks from which metals can be extracted are called

(1)

☒ **A** sand

☒ **B** limestone

☒ **C** ores

☒ **D** elements

(b) Aluminium, copper and iron are metals.
Aluminium has a low density, copper is very unreactive and iron is strong when alloyed.
These metals have many uses.

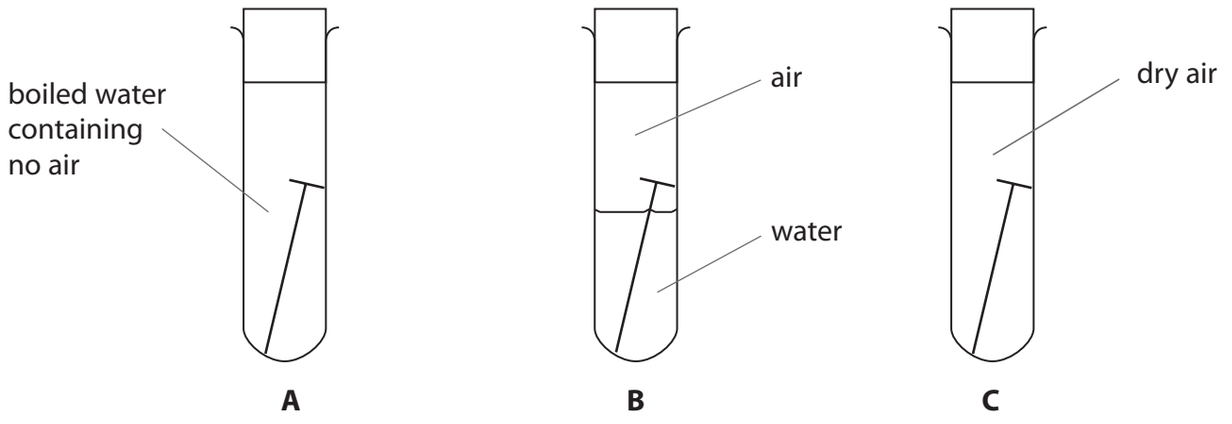
Draw **one** straight line from each metal to a use of the metal.

(3)

metal	**use**
aluminium	for water pipes
copper	making aircraft bodies
iron	making steel
	to surface roads

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(c) An experiment was carried out to investigate the conditions necessary for iron to corrode.
Three test tubes, A, B and C, had identical iron nails placed in them as shown.



After two weeks,

- the nail in tube A had not rusted
- the nail in tube B had rusted
- the nail in tube C had not rusted.

Explain why the iron nail in test tube B rusted and the iron nails in test tubes A and C did not.

(2)

.....

.....

.....

.....

(d) Scrap iron can be recycled.

Explain an advantage of recycling scrap iron rather than extracting iron from iron compounds found in the Earth.

(2)

.....

.....

.....

.....

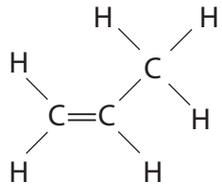
(Total for Question 1 = 8 marks)

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Hydrocarbons

2 (a) Propene is a hydrocarbon.

The diagram shows the structure of a molecule of propene.



(i) Give the names of the **two** elements combined together in propene.

(2)

.....

(ii) Propene is an alkene.
Alkenes are unsaturated.

State what you would **see** when orange bromine water is shaken with propene.

(1)

.....

(b) Propene can be made into a polymer.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The name of this polymer made from propene is

(1)

☒ **A** plastic

☒ **B** poly(propane)

☒ **C** poly(propene)

☒ **D** poly(ethene)

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(ii) Describe what is meant by the term **polymer**.

(2)

(iii) Many items made from polymers have a symbol like this.



This symbol shows that the polymer can be recycled.

Explain why it is an advantage to recycle polymers.

(2)

(Total for Question 2 = 8 marks)

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Carbonates

3 The photograph shows a sedimentary rock.



(a) State what evidence in the photograph shows that the rock is a sedimentary rock.

(1)

.....

.....

(b) Limestone is a sedimentary rock.
Limestone is mainly calcium carbonate.

Complete the sentences by putting a cross (☒) in the box next to your answer.

(i) The formula of calcium carbonate is

(1)

☒ **A** CaO

☒ **B** CaC

☒ **C** CaCO

☒ **D** $CaCO_3$

(ii) Another rock that is mainly calcium carbonate is

(1)

☒ **A** cement

☒ **B** chalk

☒ **C** granite

☒ **D** magma

(c) When metal carbonates are heated some of them decompose giving carbon dioxide.
In an experiment to investigate how fast three metal carbonates decompose, equal masses of the carbonates are heated.

The table shows the changes observed and the time for carbon dioxide to be detected.

	changes observed	**time for carbon dioxide to be detected / s**
calcium carbonate	none	none detected
zinc carbonate	white powder turns yellow when hot	236
copper carbonate	green powder turns black	40

(i) Explain what evidence in the table shows that a chemical reaction occurs when copper carbonate is heated.

(2)

.....

.....

.....

.....

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(ii) Use the information in the table to explain which of the carbonates is the easiest to decompose.

(2)

(iii) Describe an experiment in which copper carbonate is heated and the gas evolved is tested to show that the gas is carbon dioxide.

(3)

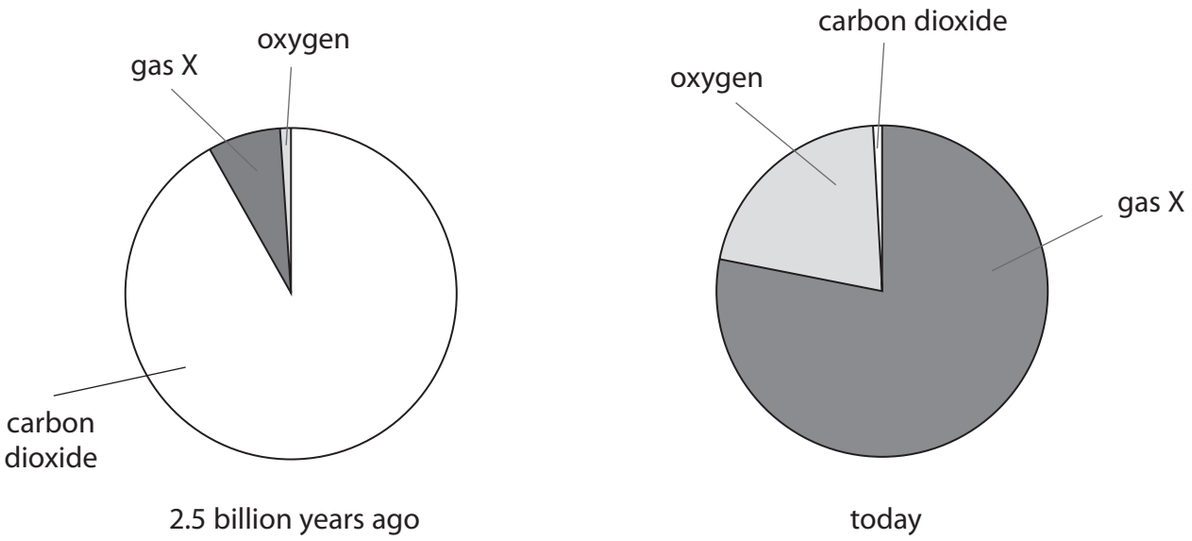
(Total for Question 3 = 10 marks)

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The atmosphere

4 The pie charts show the likely composition of the atmosphere 2.5 billion years ago and what its composition is today.



2.5 billion years ago

today

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

Gas X is

(1)

☒ **A** chlorine

☒ **B** hydrogen

☒ **C** nitrogen

☒ **D** radon

(b) State what produced the gases in the Earth's early atmosphere.

(1)

.....

(c) Describe how carbon dioxide from the atmosphere becomes calcium carbonate in rocks.

(2)

(d) When primitive plants appeared on Earth, the amount of oxygen in the atmosphere changed.

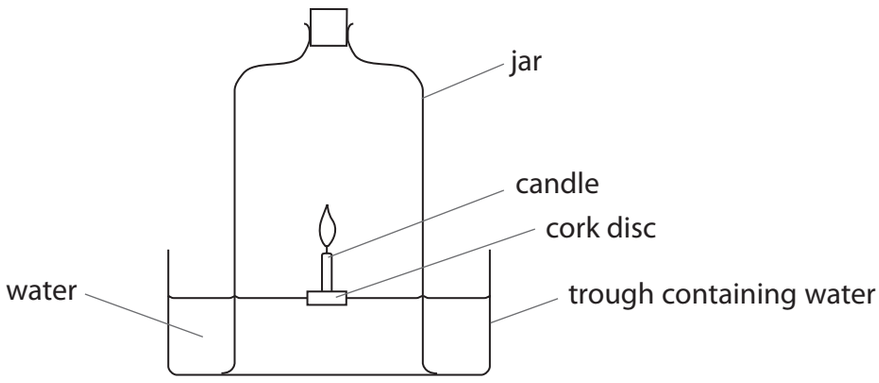
Explain why.

(2)

P 4 0 1 9 7 A 0 1 2 2 0

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(e) The diagram shows a candle floating in a trough of water.
A jar was placed over the candle after the candle was lit.



After the candle flame went out, the apparatus was left to cool to room temperature.

Explain how the water level inside the jar at the end of the experiment will have changed compared with the water level inside the jar at the start of the experiment.

(3)

.....

.....

.....

.....

.....

.....

(f) Candles are made of wax which contains octadecane.
Octadecane burns in air to form carbon dioxide and water only.

Write the word equation for this reaction.

(2)

..... + ... → ..... + ...

(Total for Question 4 = 11 marks)

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Fuels

5 When fuels are burnt, various gases can be given off including carbon monoxide, carbon dioxide, water vapour and sulfur dioxide.

(a) Give the name of the element that burns, in oxygen, to form sulfur dioxide.

(1)

.....

(b) Sulfur dioxide dissolves in water in the atmosphere to form acid rain.

State **two** problems caused by acid rain.

(2)

.....

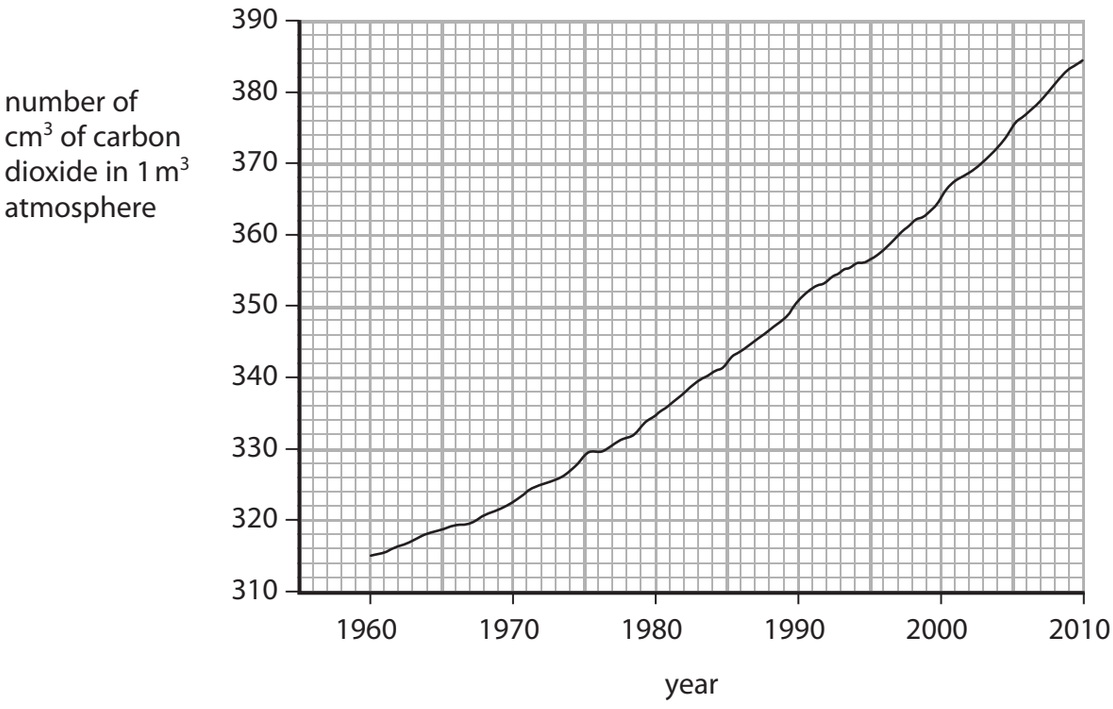
.....

.....

.....

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(c) The graph shows the concentration of carbon dioxide in the atmosphere above Hawaii from 1960 to 2010.



During this time, the average temperature on the Earth has increased by about 0.5 °C. Some people think that a change in the amount of carbon dioxide in the atmosphere has caused this change in temperature.

Explain how the data might or might not provide evidence for this idea.

(2)

.....

.....

.....

.....

(d) Complete the sentence by putting a cross (☒) in the box next to your answer.

Biofuels made from plants can be used instead of fossil fuels.
One advantage of using biofuels instead of fossil fuels is that they

(1)

☒ **A** are renewable

☒ **B** do not produce carbon dioxide when burnt

☒ **C** do not contain carbon

☒ **D** do not need land for their production

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*(e) An experiment was carried out to determine the amount of heat energy released when different fuels were burned.
Equal masses of four different fuels, A, B, C and D, were burned and the heat energy released was used to raise the temperature of 100 g of water.

The table shows information about each fuel and the results of the experiment.

fuel	state of fuel at room temperature	ease of lighting fuel	relative amount of smoke produced	temperature rise of water/ °C
A	gas	very easy	none	12
B	liquid	very easy	none	20
C	liquid	easy	very little	38
D	liquid	easy	very little	45

Give the advantages and disadvantages of each fuel, explaining which of the four fuels would be best for use in a domestic heater.

(6)

(Total for Question 5 = 12 marks)

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Acids

6 Hydrochloric acid is produced in the stomach.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

A reason why hydrochloric acid is produced in the stomach is to

(1)

☒ **A** break down food

☒ **B** improve the taste of the food

☒ **C** neutralise acids

☒ **D** produce gases

(b) Too much hydrochloric acid in the stomach can cause indigestion.
Indigestion tablets work by neutralising the excess hydrochloric acid in the stomach.

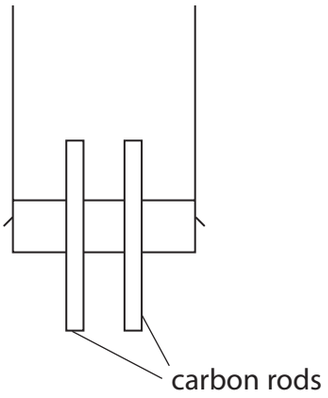
Some indigestion tablets contain calcium carbonate.
The calcium carbonate reacts with the excess hydrochloric acid to form calcium chloride, water and carbon dioxide gas.

Write the word equation for this reaction.

(1)

.....

*(c) Electrolysis can be used to decompose hydrochloric acid, HCl, into its elements.
Part of the apparatus that can be used is shown.



Explain how you would use this apparatus to carry out the electrolysis of hydrochloric acid in the laboratory, naming the products formed.
You may add to the diagram to help with your answer.

(6)

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(d) A student is given a test tube of oxygen and a test tube of hydrogen.
The test tubes are unlabelled.

Explain how the student could test the gases to identify which test tube contains which gas.

(3)

.....

.....

.....

.....

.....

.....

(Total for Question 6 = 11 marks)

TOTAL FOR PAPER = 60 MARKS

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Mark Scheme (Results)

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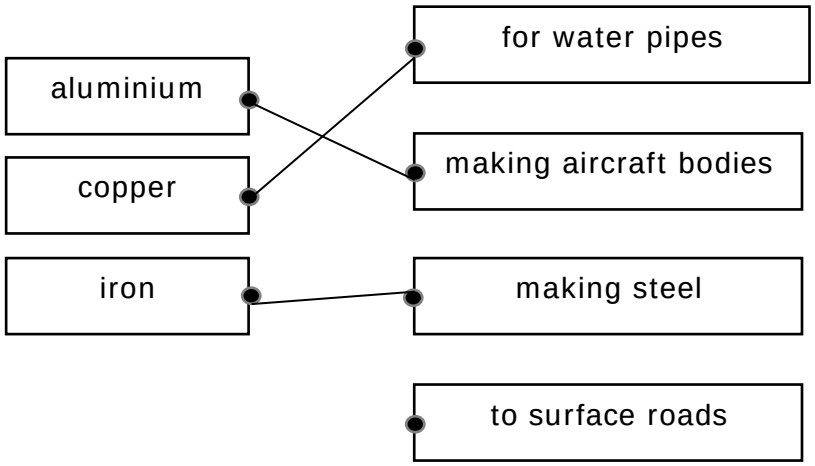
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5CH1F/01 Mark Scheme
March 2012

Question Number	Answer	Acceptable answers	Mark
1(a)	C		**(1)**

Question Number	Answer	Mark
1(b)		**(3)**

Question Number	Answer	Acceptable answers	Mark
1(c)	an explanation linking the following points • (both) water and oxygen (are needed) (1) • only B has both / A has no oxygen / C has no water (1)	allow air for oxygen allow reacts with water and oxygen allow air for oxygen A only has water/C only has air A and/or C only have one/do not have both	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(d)	an explanation linking two of • conserves reserves (of iron ore) (1) • reduces a stated problem of mining (1) eg reduces carbon dioxide emissions (from machinery/trucks) /specific environmental problem reduced eg noise pollution/dust pollution • reduces (scrap iron going to) landfill	resources/supplies reserves/resources/supplies last longer limited supply of iron ore reserves/resources/supplies will not run out (as quickly) ignore saves iron unqualified ignore iron is non-renewable allow visual pollution avoided eg fewer holes in ground ignore reduces pollution if not qualified ignore better for environment ignore more environmentally friendly ignore recycling is easier ignore iron difficult to extract allow less energy needed/uses less fossil fuels ignore cost/cheaper unless qualified eg cheaper just to melt than to extract	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	• carbon (1) • hydrogen (1)	in either order ignore symbols **look for key words but reject carbon dioxide**	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	(turns) colourless/decolourises/ (orange) colour disappears	loses its colour ignore clear/transparent	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	A description including one of the following pairs • large molecule (1) • (formed from) (many) small molecules/monomers/alkenes (molecules) (1) OR • (formed when) (many) small molecules / monomers / alkenes (molecules) (1) • joined together (1)	long chain(molecule) named alkene named alkene added/linked	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	An explanation linking **one of the following pairs** • conserves crude oil /(natural)resource (1) • because do not have to make more (monomer/polymer) (1) OR • conserves crude oil((1) • which is a finite resource (1) OR • stops landfill filling up (1) • (which happens because) polymers non-biodegradable (1) OR • (polymers) are burnt/incinerated (1) • releases carbon dioxide/toxic gas (emissions) conditional on burning/incinerating(1)	uses less crude oil/(natural) resources ignore can be reused uses less crude oil non-renewable being sent to landfill taking up space in landfill ignore less waste do not decompose/break down/rot decompose/break down slowly harmful/dangerous ignore bad accept named toxic gas ignore cheaper ignore uses less energy ignore recycling does not pollute atmosphere as much ignore less damage/better for environment	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(a)	layers/layered		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	D		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	B		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)(i)	an explanation linking • (because) colour change / (changes from green to) black (1) • carbon dioxide (formed) (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(ii)	an explanation linking the following points • copper (carbonate) (1) • because it produces {gas / carbon dioxide} fastest/in shortest time(1)	took (only) 40 seconds changed colour first/fastest fastest time reacts the fastest second mark dependent on first mark but if no carbonate named can score second mark	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)(iii)	an explanation linking three of the following • (heat copper carbonate) in suitable container (which allows gas to be tested) (1) • suitable method of passing/collecting the gas e.g. bubble gas into / use of a delivery tube / collect gas in test tube (1) • limewater (1) • white (ppt)/ cloudy / milky(1)	marks could be gained from a diagram not just add gas to not blow ignore lighted/glowing splints dependent on correct use of limewater	**(3)**

Question Number	Answer	Acceptable answers	Mark
4 (a)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)	volcanoes	ignore other responses	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)	a description including **two** of the following points • dissolves in oceans/seas /water (1) • (used to form) skeletons / shells (of marine organisms) (1) • (these) formed sediments (when the organisms died) (which were then compacted) (1)	oceans/seas/water absorb (carbon dioxide) sedimentary rocks or limestone/chalk	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)	an explanation linking the following points • (plants) undergo photosynthesis/absorb carbon dioxide (1) • gives off oxygen / increases oxygen (in atmosphere) (1)	spelling does not need to be perfect but must be recognisable changes carbon dioxide into oxygen ignore references to breathing	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(e)	an explanation linking three of • water level risen (1) • because (candle) burning uses oxygen (1) • water takes place of oxygen • one fifth of way up jar / only part way as air is 20% oxygen (1)	water level increased oxygen needed to keep candle lit flame goes out when oxygen used up do not allow oxygen burns	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(f)	octadecane + oxygen (1)→ carbon dioxide + water (1)	allow wax + oxygen → carbon dioxide + water reject air allow correct formulae if words and formulae given ignore formulae	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)	sulfur	allow S allow recognisable spelling not sulfate not sulfide not sulfite	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)	any **two** of the following • damages one of statues / buildings / stonework /limestone/marble/chalk/ iron / steel (1) • damages one of trees/plants/soil (1) • specified water life affected e.g. fish die (1)	erodes/corrodes/weathers/ decays/ruins/rots/dissolves/ destroys/affects ignore any other rocks ignore deforestation makes lakes acidic	**(2)**

Question Number	Answer	Acceptable answers	Mark
5 (c)	an explanation linking • carbon dioxide has increased (1) with **one** of the following points • (average) temperature has increased **/ as well / also / too** (so there may be a link) (1) OR • although (average) temperature change it might be a natural fluctuation (1) OR • although (average) temperature change is not necessarily caused by carbon dioxide levels (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
5(d)	A		**(1)**

Question Number		Indicative Content	Mark
QWC	***5e**	An explanation linking some of the following points Fuel A • very easy to light • not smoky • gives off least heat • gas so harder to store Fuel B • very easy to light • not smoky • doesn't give off most heat • liquid so easy to store Fuel C • easy to light, but harder than A or B • little bit of smoke • doesn't give off most heat • liquid so easy to store Fuel D • easy to light, but harder than A or B • little bit of smoke • gives off most heat • liquid so easy to store Conclusion (any justified) • e.g. B best as although less energy than D easier to ignite and little smoke • e.g. D best although smokier gives more energy	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation e.g. D gives off most heat • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation with correct comparative statement about at least three properties and two fuels, e.g. D gives off most heat and gives a little smoke but A is easier/very easy to light OR conclusion with statement about two properties and one fuel e.g. B is best because it is very easy to light, and gives no smoke • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed explanation with correct comparative statement about three properties and three fuels e.g. A and B are the easiest to light and give off no smoke but give lowest temperature rise and D gives the most heat OR a conclusion with statement about three properties e.g. D is the best fuel because it is quite easy to light and produces biggest temperature rise even though gives off (little) smoke • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
6 (a)	A		**(1)**

Question Number	Answer	Acceptable answers	Mark
6 (b)	calcium carbonate + hydrochloric acid → carbon dioxide + water + calcium chloride	Allow correct formulae	**(1)**

Question Number		Indicative content	Mark
QWC	***6(c)**	an explanation linking some of the following points (could be in diagram) • put acid in container • attach power supply/electricity supply • use direct current • test tube inverted over electrode(s) • bubbles seen • one product hydrogen • one product chlorine • bleached litmus • relevant safety precaution	**(6)**
Level	**0**	No rewardable content	
1	**1-2**	• a limited explanation e.g. one correct statement eg pass electricity (through acid) • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3-4**	• a simple explanation e.g pass electricty through the acid and hydrogen or chlorine formed • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed explanatione.eg. electricity is passed through the acid, hydrogen and chlorine are formed • eg puts acid in container, uses direct current, puts test tube over electrode to collect chlorine • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
6(d)	an explanation linking three of • test with a lighted splint (1) • hydrogen burns / pop (1) • test with glowing splint(1) • oxygen relights it(1) • how other gas behaves in either test/ states other gas is(1)	In test for oxygen: ignore “light splint and blow flame out” ignore “ use recently put out splint” ignore “ use blown out splint”	**(3)**

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Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Chemistry/Science

Unit C1: Chemistry in Our World

Foundation Tier

Wednesday 9 November 2011 – Morning
Time: 1 hour

Paper Reference
5CH1F/01

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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1/1/1/1/

P 4 0 1 7 6 A 0 1 2 0

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The Periodic Table of the Elements

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	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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

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

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Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Problems caused by acids

1 (a) Hydrochloric acid is produced in the stomach.
When too much acid is produced it can cause indigestion.

(i) Give a reason why hydrochloric acid is present in the stomach.

(1)

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The formula of hydrochloric acid is

(1)

☒ **A** HCl

☒ **B** H_2Cl

☒ **C** HCl_2

☒ **D** HCl^2

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(iii) Which of these hazard symbols should be used on a container of dilute hydrochloric acid to show that it is an irritant?

Put a cross (☒) in the box next to your answer.

(1)



☒ **A**



☒ **B**



☒ **C**



☒ **D**

(b) Indigestion can cause pain in the chest.
Indigestion tablets can be taken to relieve this pain.



(i) Explain how indigestion tablets relieve this pain.

(2)

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(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Some indigestion tablets contain magnesium carbonate.
When magnesium carbonate is added to dilute hydrochloric acid, a salt is formed.

The name of the salt formed is

(1)

☒ **A** magnesium oxide

☒ **B** magnesium nitrate

☒ **C** magnesium chloride

☒ **D** magnesium sulphate

(c) Waste gases from coal-fired power stations can be acidic.
These waste gases can be passed through calcium carbonate.

Explain how the calcium carbonate helps to reduce the amount of acid rain.

(2)

.....

.....

.....

.....

(Total for Question 1 = 8 marks)

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Crude oil products

2 Crude oil is separated into fractions.
Crude oils from different oil wells contain different percentages of the fractions.

The table shows the percentages of the fractions in crude oils from three different oil wells.

	percentage of fraction in crude oil from		
fraction	**oil well A**	**oil well B**	**oil well C**
gases	1	6	9
petrol	2	15	24
kerosene	6	14	20
diesel oil	7	10	16
fuel oil	26	28	30
bitumen	58	27	1

(a) Give the name of the process that is used to separate crude oil into fractions.

(2)

(b) Crude oil from which oil well contains the most petrol?

(1)

(c) Which fraction is present in almost the same percentage in the crude oils from all three oil wells?

(1)

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(d) Complete the sentence by putting a cross (☒) in the box next to your answer.

Kerosene is used as a fuel for

(1)

- ☒ **A** cars
- ☒ **B** large ships
- ☒ **C** jet aircraft
- ☒ **D** power stations

(e) Petrol fractions contain the hydrocarbon octane, C_8H_{18}.

Explain what is meant by the term **hydrocarbon**.

(2)

(f) One product obtained when hydrocarbons burn in air is carbon dioxide.

Describe a test to show that a gas is carbon dioxide.

(2)

(Total for Question 2 = 9 marks)

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Ethene and poly(ethene)

3 (a) Ethene is an unsaturated hydrocarbon.

State what is meant by the term **unsaturated**.

(1)

.....

(b) Complete the sentences by putting a cross (☒) in the box next to your answer.

(i) When bromine water is shaken with ethene, it changes colour.

The bromine water becomes

(1)

☒ **A** orange

☒ **B** brown

☒ **C** colourless

☒ **D** clear

(ii) The formula of ethene is

(1)

☒ **A** CH_4

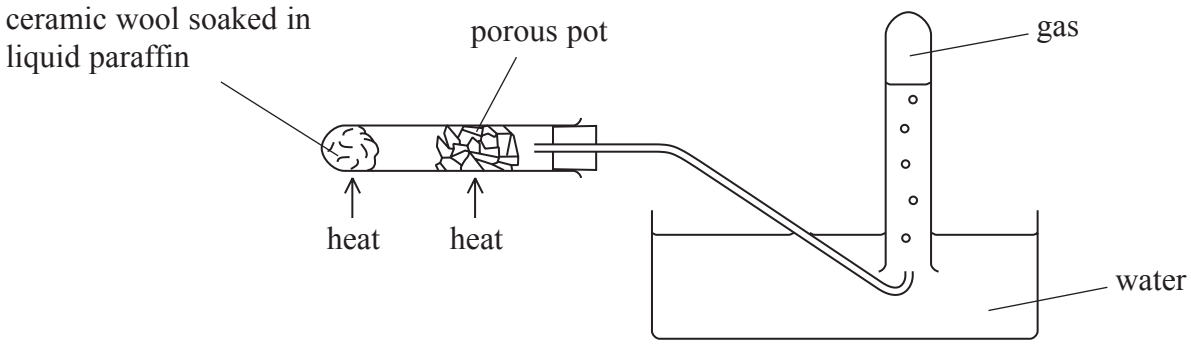
☒ **B** C_2H_4

☒ **C** C_2H_6

☒ **D** C_3H_8

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(c) A gas containing ethene can be produced from liquid paraffin using this apparatus.



Describe how liquid paraffin becomes ethene in this experiment.

(3)

(d) Ethene is used to make poly(ethene).

Describe how ethene molecules form poly(ethene) molecules.

(2)

(e) Waste poly(ethene) can cause problems.

Explain the problems caused by waste poly(ethene).

(2)

.....

.....

.....

.....

.....

(Total for Question 3 = 10 marks)

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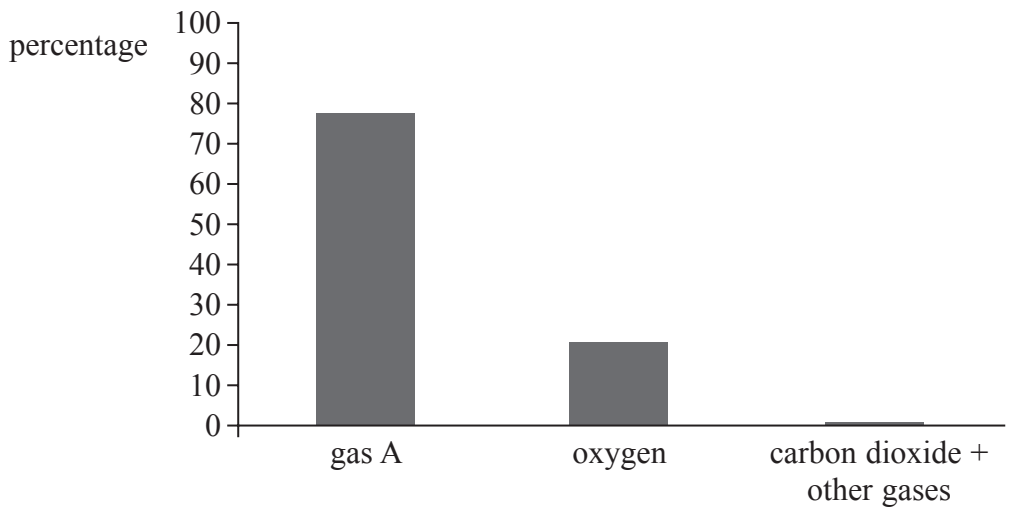
Turn over for Question 4

P 4 0 1 7 6 A 0 1 1 2 0

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The atmosphere

4 (a) The bar chart shows the percentage of gases in the Earth's atmosphere.



(i) Give the name of gas A.

(1)

(ii) Which of the gases listed below is naturally present in the atmosphere?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** argon

☒ **B** carbon

☒ **C** chlorine

☒ **D** hydrogen

(b) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The gases in the Earth's earliest atmosphere were thought to originate from

(1)

☒ **A** plants

☒ **B** the ocean

☒ **C** volcanoes

☒ **D** ice caps

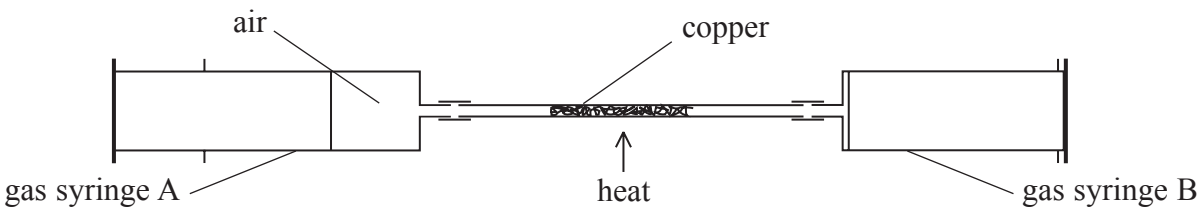
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(ii) Explain how the growth of primitive plants changed the percentage of oxygen and carbon dioxide in the Earth's early atmosphere.

(2)

*(c) Experiments can be carried out to find the volume of oxygen in a given volume of air.
When hot, copper reacts with oxygen.

In one experiment the following apparatus is used.
At the start of the experiment, 100 cm^3 of air is in gas syringe A.
The air is passed backwards and forwards over the heated copper.



Describe how the apparatus can be used to show that the 100 cm^3 of air contained 21 cm^3 of oxygen.

(6)

(Total for Question 4 = 11 marks)

P 4 0 1 7 6 A 0 1 3 2 0

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Calcium carbonate

5 The picture shows a piece of limestone rock containing fossils.



(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Limestone is a form of calcium carbonate.

The elements present in calcium carbonate are

(1)

☒ **A** calcium and oxygen only

☒ **B** calcium and carbon only

☒ **C** calcium and carbonate only

☒ **D** calcium, carbon and oxygen only

(ii) Limestone is a sedimentary rock.

Explain how fossils are formed in limestone.

(3)

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(b) Marble is also a form of calcium carbonate.
It is a metamorphic rock.

Explain how marble is formed from limestone.

(2)

(c) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

When calcium carbonate is heated it reacts to form calcium oxide and carbon dioxide.

This reaction is an example of

(1)

☒ **A** electrolysis

☒ **B** incomplete combustion

☒ **C** cracking

☒ **D** thermal decomposition

(ii) Write the word equation for this reaction.

(1)

(d) Describe what you would **see** when water is added drop by drop to a sample of cold calcium oxide.

(2)

(Total for Question 5 = 10 marks)

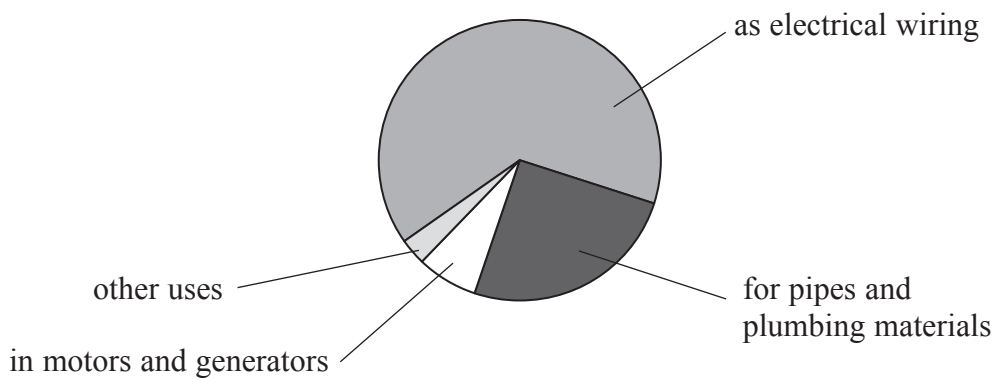
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Metals

6 The pie chart shows the main uses of copper.



(a) Use the pie chart to give the biggest use for copper.

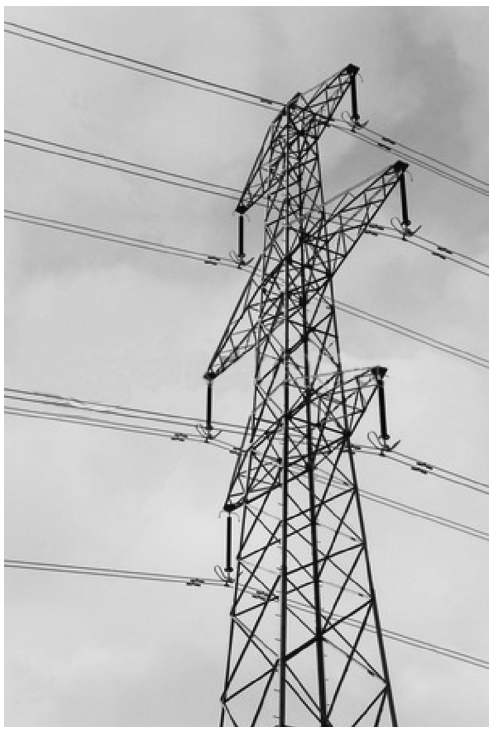
(1)

(b) Copper can be extracted from a naturally occurring substance called malachite.

State the name given to naturally occurring substances from which metals are extracted.

(1)

(c) Overhead power cables supported on pylons are used to carry electricity.



The table shows information about three metallic substances.

metallic substance	density / kg m^{-3}	cost per tonne / £	relative strength	relative ability to conduct electricity	relative resistance to corrosion
copper	8920	5279	high	very good	good
aluminium	2700	1425	high	good	good
steel	7820	505	very high	good	poor

(i) The pylons are made of steel.

Use information from the table to explain which properties of steel make it the most suitable of these three metals for the pylons.

(2)

.....

.....

.....

.....

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(ii) Use information from the table to explain which properties of aluminium make it more suitable than copper for making overhead power cables.

(2)

*(d) Iron for making steel, copper and aluminium is obtained from substances found in the Earth's crust.

The metals are made into many useful things.
When no longer required the metal articles are thrown away as waste or recycled.

Explain why it is important to recycle these metals rather than put them in general household waste.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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5CH1F/01 Mark Scheme
November 2011

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	(help) digestion / kill bacteria / break down food	Allow break up food	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	A		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(iii)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	An explanation linking **two** of the following • (indigestion is caused by excess) acid (1) • (indigestion tablets) remove / react with / break down / neutralise /increase the pH / change the pH to 7 / form a salt with the acid (1)	Ignore dilute / dissolve Allow {magnesium carbonate / indigestion tablets} are bases (allow alkali)	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)	An explanation linking **two** of the following points: • calcium carbonate {reacts with / absorbs / neutralises / removes / eliminates } gas(1) • waste gases /acidic gases / sulfur (di)oxide / nitrogen (di)oxide (1) • (these) gases / sulfur (di)oxide/ nitrogen (di)oxide do not escape (into the atmosphere) (1) • so they do not cause acid rain (1)	Allow there will be less acid in the atmosphere	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)	fractional distillation (2)	distillation / fractionation (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)	(oil well) C		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)	fuel oil		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(d)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(e)	An explanation including the following: • (compound of) carbon and hydrogen (1) • only (1)	Ignore reference to mixture	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(f)	A description including the following • (pass gas into) { limewater / calcium hydroxide solution} which turns {milky / cloudy / white precipitate} (2)	Allow limewater / calcium hydroxide solution with incorrect or no observation (1) Ignore puts out a flame	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (a)	(contains carbon-carbon) double bond / multiple bond	Allow it is an alkene Allow it decolourises bromine **Ignore** spare bonds	**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	B		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(c)	A description including **three** of the following: • heat the (liquid) paraffin (1) • liquid paraffin vapourised (1) • cracking (1) • heat / hot porous pot (1) • causes thermal decomposition / breaks down (1) • (causes)large molecules / chains (1) • (to produce) small molecules / chains(1)	Allow liquid paraffin turns to a gas (but **not** if the gas is ethene)	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(d)	A description including **two** of the following points • double bond (1) • (double bond) breaks (1) • ethene is a monomer (1) • **many** ethene (molecules)(1) • join / add / combine / react /bond (1) • to form polymer / (during) polymerisation(1)	Points may be shown on a diagram / equation. Ignore conditions. Allow opens up /becomes a {single bond / alkane} Allow to form a long chain	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (e)	An explanation linking **two** of the following points: • non-biodegradable(1) • (therefore) does not rot / does not break down / disintegrate(1) • lasts for a long time / stays there(1) • fills up landfill (sites)(1) • (causes) litter / looks unattractive (1) • causes pollution (1) • can be a danger to wildlife (1) • produces gases **when burnt** (1) • a gas mentioned **as a result of burning** linked to the environmental problem it causes eg carbon dioxide is a greenhouse gas, some gases are toxic (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	nitrogen / N_2	Reject nitrate / N	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	A		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	C		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	An explanation linking **two** of the following points: • decrease the percentage of /removes / takes in carbon dioxide (1) • increase the percentage of /produces / gives out oxygen (1) • photosynthesis (1)	Ignore 'breathes in or out' Ignore decreases amount of oxygen Ignore increases amount of carbon dioxide	**(2)**

Question Number		Indicative Content	Mark
QWC	***4(c)**	A description including some of the following points: • push / pull syringes to move air • volume of air in syringes decreases • oxygen removed from air • copper reacts / joins with oxygen • copper oxide formed • continue until no further change • allow (apparatus) to cool • final reading on gas syringe = 100 – 21 / 79 (80) cm^3 • because 21 (20) cm^3 of oxygen has reacted	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. push in syringe A to pass air over the copper / copper reacts with oxygen • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. (hot) copper reacts with oxygen to produce copper oxide / copper oxide is formed and the volume of air decreases • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description e.g. when the air is passed over the (hot) copper, oxygen reacts with copper so the volume of air decrease until there is no further change /by 21 cm^3 • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	D		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	An explanation linking **three** of the following points • dead animals / plants (1) • (dead animals / plants) become covered in sediment (1) • are {squashed / crushed / compacted / pressured} (as layers of sediment build up on top of one another) (1) • long time period (1) • fossils are caused by skeletons /bones / shells / remains (1)	Ignore heat Allow covered in sand / rock / limestone	**(3)**

Question Number	Answer	Acceptable answers	Mark
5(b)	An explanation linking the following points (limestone is subject to) • heat(1) • and pressure (1) (from the surrounding earth)	Ignore melting / magma / lava Ignore crushed	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(c)(i)	D		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(c)(ii)	calcium carbonate → calcium oxide + carbon dioxide	Ignore heat in equation or on arrow Allow correct formulae instead of words e.g. $CaCO_3 \rightarrow CaO + CO_2$	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(d)	A description to include two of the following points • bubbles / fizzes (1) • steam (1) • solid swells (1) • (solid) crumbles / breaks up (1) • white powder (1) • (some) of the solid disappears (1) • water goes cloudy / milky (1)	Ignore any colour changes Allow smoke Allow dissolves 	 **(2)**

Question Number	Answer	Acceptable answers	Mark
6(a)	(electrical) wiring		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(b)	ore(s)		**(1)**

Question Number	Answer	Acceptable answers	Mark
6 (c)(i)	An explanation linking **two** of the following points • strength / strong (1) • (to) withstand forces/hold up heavy cable (1) • low cost / cheap(1)	Reject reasons for copper or aluminium being the best metal to use **MAXIMUM** (1) if include poor resistance to corrosion and/or good conductor of electricity	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(c)(ii)	An explanation linking **two** from the following points • low density/light(1) • (so) fewer pylons needed / easier to support (1) • (therefore) low cost/ cheap(1)	Ignore any additional properties mentioned in answer	**(2)**

Question Number		Indicative Content	Mark
QWC	***6(d)**	An explanation including some of the following points • copper used for pipes / wiring / vehicles • aluminium used for cans / wires / alloys • steel used for bridges / making stainless steel cutlery etc • recycled metals can be made into something useful • saves (finite) resources / stops the metal (ore) running out • less damage to environment by mining/quarrying • less waste • landfill sites will not fill up as quickly • (some) metals do not corrode /break down • (so)remain a long time in landfill • so fewer landfills needed • less damage to environment from waste • copper waste toxic • less expensive than electrolysis	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation e.g. if we throw the metals away they will run out / if we recycle, the metal can be used for something else • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation e.g. throwing the metals away will fill up landfill sites, recycling will save mining for new ore • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed explanation e.g. Recycled metals can be made into other useful products. Metals in landfill sites do not corrode quickly. If new ore is used deposits will eventually run out. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

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