Write your name here

Surname	Other names

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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P 4 0 2 3 9 A 0 1 2 0

PEARSON

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

(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)

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

(i) State the meaning of the term **alloy**.

(1)

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(ii) Cutlery is made of stainless steel.

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

(1)

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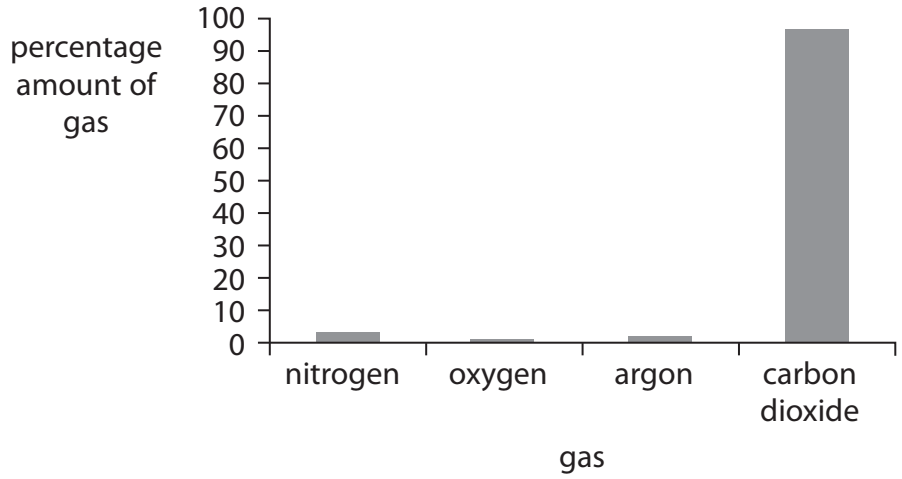
(Total for Question 1 = 8 marks)

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)

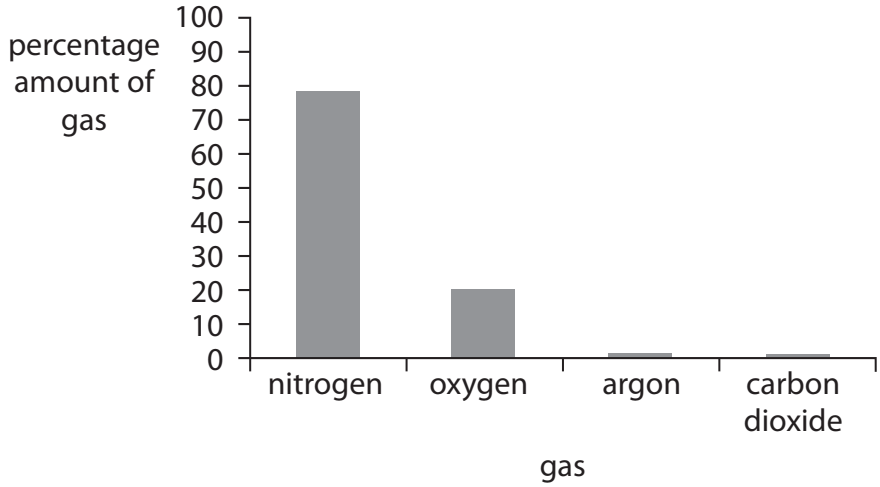
☒ **A** animals breathing

☒ **B** trees burning

☒ **C** plants photosynthesising

☒ **D** volcanoes erupting

(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)

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(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)

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.....

(e) Apart from burning fossil fuels, state **two** other activities that affect the amounts of gases in the atmosphere.

(2)

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(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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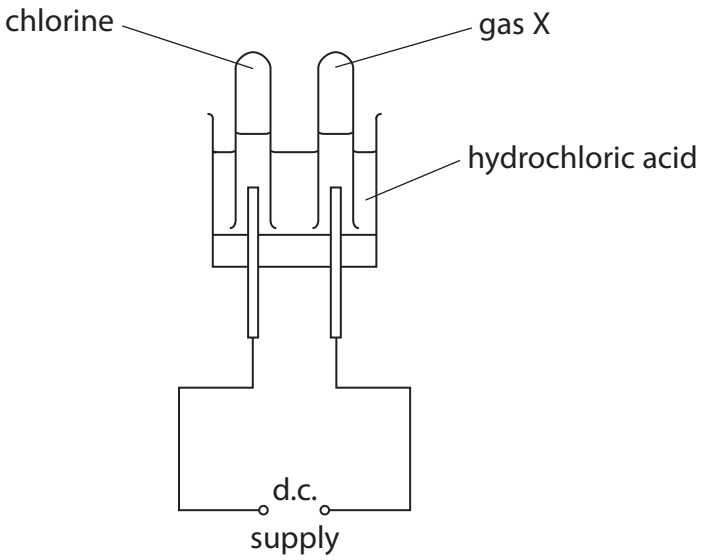
(d) Hydrochloric acid was electrolysed using the apparatus shown.



(i) Chlorine gas was collected in one of the test tubes.

Describe a test to show the gas is chlorine.

(2)

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(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)

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(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)

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.....

(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)

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(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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.....

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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)

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.....

(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)

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.....

.....

(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?

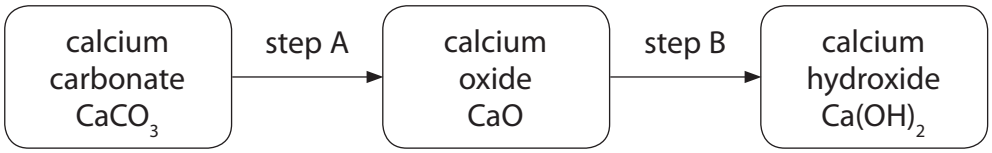
Put a cross (☒) in the box next to your answer.

(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)

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(ii) Write the word equation for the reaction in step B.

(2)

.....

*(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)

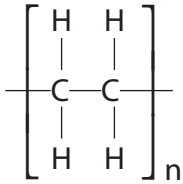
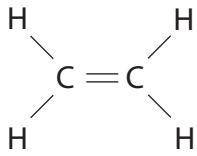
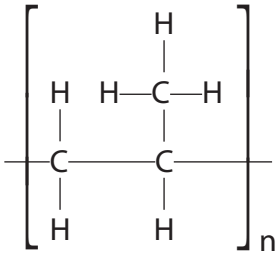
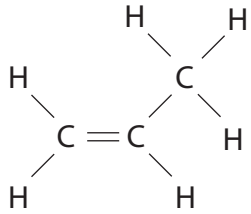
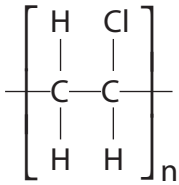
Polymers

6 Polymer molecules are made by joining large numbers of small molecules (monomers) together.

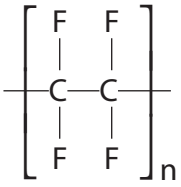
(a) The table shows some information about three polymers and the monomers used to make them.

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	.....

(b) The structure of the polymer poly(tetrafluoroethene), PTFE, is



State why this polymer is **not** a hydrocarbon.

(1)

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.....

(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)

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.....

*(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