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 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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1/2/1/1/1/

P 4 8 5 7 8 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 ☒.

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

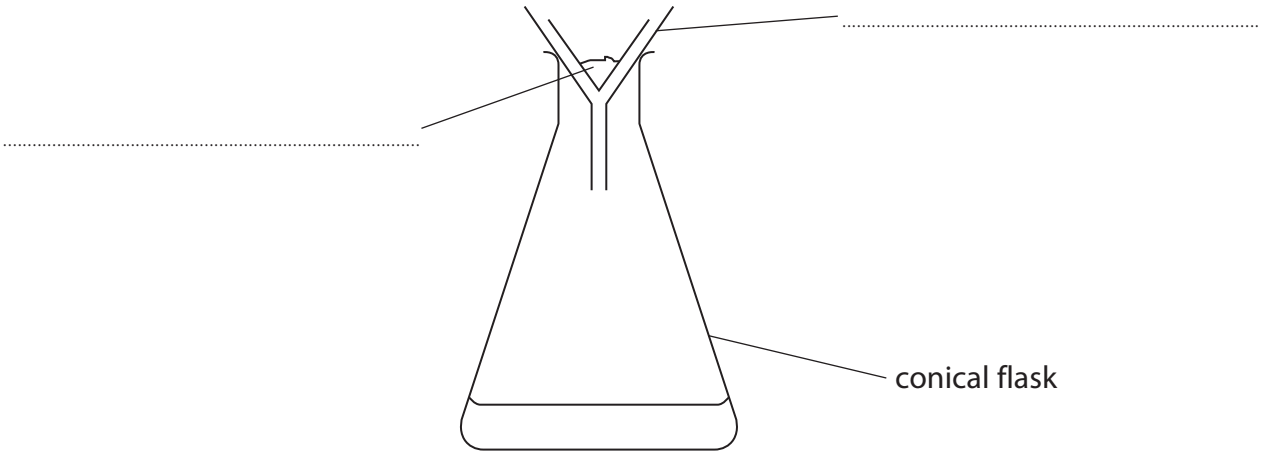
☒ **B** calcium hydroxide

☒ **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)

(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)

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 ..... .

(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)

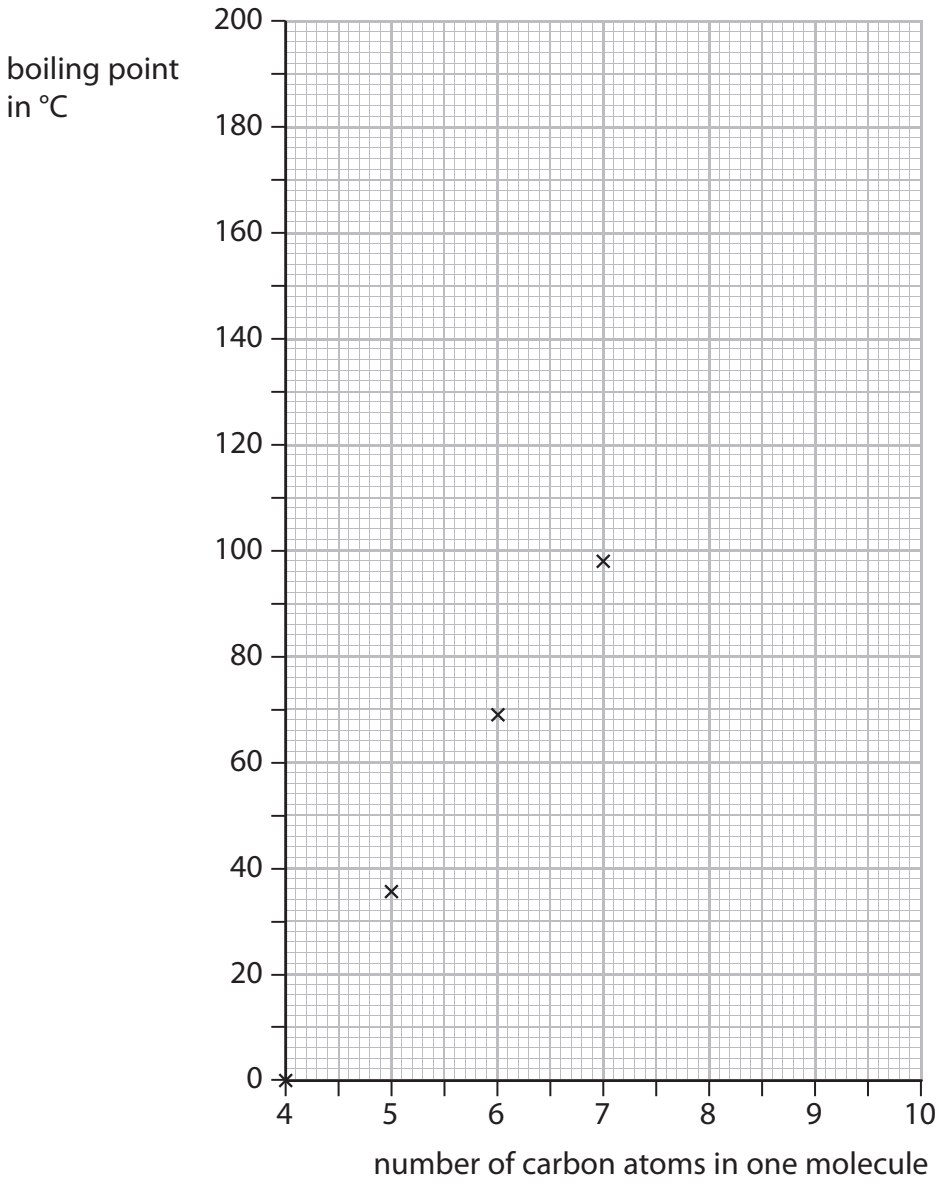
Alkanes

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.



(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

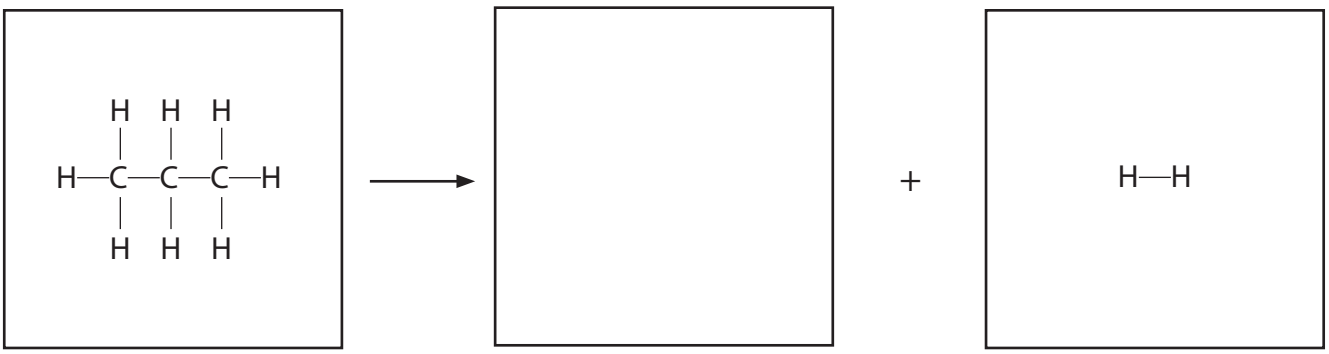
☒ **D** have molecules that each have a C═C bond

(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)

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.

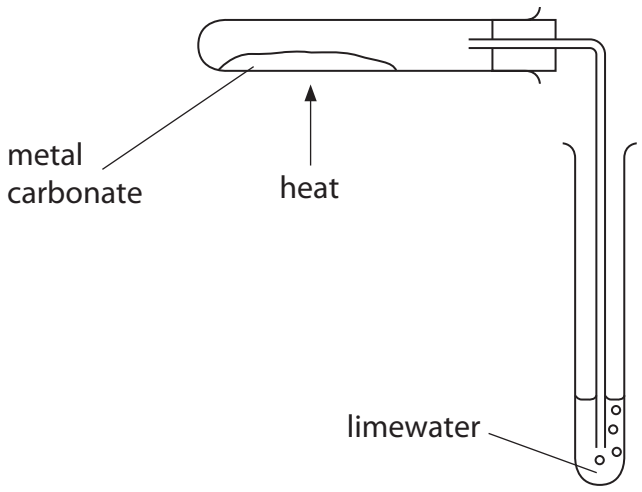
Calculate the mass of carbon dioxide gas given off in this reaction.

(1)

mass of carbon dioxide = ... g

(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)

.....

.....

(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

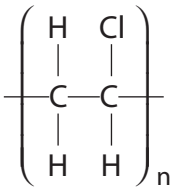
☒ **A** carbon dioxide is released

☒ **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)

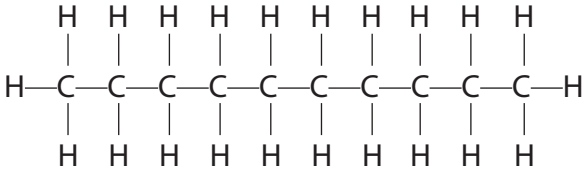
.....

.....

.....

.....

(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)

*(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)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS