Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Chemistry/Science

Unit C1: Chemistry in Our World

Higher Tier

Thursday 18 May 2017 – Morning
Time: 1 hour

Paper Reference
5CH1H/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/

P 4 8 5 7 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 ☒.

Carbon dioxide

1 Carbon dioxide dissolves in the water in the Earth's oceans.

(a) Describe how these oceans were originally formed.

(2)

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(b) Some rocks are formed from dissolved carbon dioxide.

(i) Describe how this happens.

(2)

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

(1)

The substance formed in these rocks is

☒ **A** calcium carbonate

☒ **B** sodium chloride

☒ **C** calcium hydroxide

☒ **D** iron oxide

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(c) Iron seeding is the introduction of iron into the ocean.
This stimulates the growth of small plants.

Explain how the growth of these plants affects the amount of carbon dioxide in the atmosphere.

(2)

(d) Carbon dioxide is one of the products of the complete combustion of methane in air.

Write the word equation for this reaction.

(2)

(Total for Question 1 = 9 marks)

Acids and electrolysis

2 Acids can undergo neutralisation to form salts.

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

(1)

An acid reacts with a metal oxide to form

☒ **A** a salt + carbon dioxide

☒ **B** a salt + hydrogen

☒ **C** a salt + oxygen

☒ **D** a salt + water

(b) Acids also react with metal carbonates.

The equation for the reaction of calcium carbonate with dilute hydrochloric acid is

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$$

Describe what you would **see** when solid calcium carbonate reacts with dilute hydrochloric acid.

(2)

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.....

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(c) Hydrogen and oxygen are produced by the electrolysis of water, acidified with a small amount of dilute sulfuric acid.

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

(2)

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

(2)

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

(2)

(Total for Question 2 = 9 marks)

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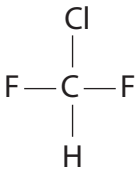
Organic compounds

3 (a) (i) Methane, CH_4, is a hydrocarbon.

Chlorodifluoromethane can be formed from methane.
A diagram of one molecule of this compound is



Explain whether or not this molecule is a hydrocarbon.

(2)

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(ii) Chlorodifluoromethane is a gas.
When it is bubbled through bromine water, the orange colour remains.

State what this shows about the structure of this compound.

(1)

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(b) Gases in the atmosphere that trap heat from the Sun are known as 'greenhouse gases'.

(i) Give one possible consequence of an increase in the amount of these gases in the atmosphere.

(1)

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

(1)

Chlorodifluoromethane is a gas that traps heat from the Sun.

Another gas that traps heat from the Sun is

☒ **A** argon

☒ **B** nitrogen

☒ **C** oxygen

☒ **D** water vapour

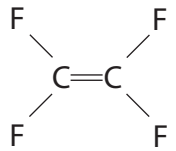
(c) When chlorodifluoromethane, $CHClF_2$, is strongly heated, it decomposes to form tetrafluoroethene, C_2F_4, and hydrogen chloride.

Complete the balanced equation for this reaction.

(2)

$2CHClF_2 \rightarrow$ ..... + ...

(d) The structure of a molecule of tetrafluoroethene is



A sample of this gas was kept in a cylinder under high pressure.
The cylinder was left unused for a long time.

When the cylinder was opened no gas remained.
Instead it contained a slippery, waxy, white solid.

(i) State the type of reaction that occurred when tetrafluoroethene gas formed the solid.

(1)

.....

(ii) Deduce the name of the solid formed.

(1)

.....

(Total for Question 3 = 9 marks)

Metals

4 (a) Most metals are extracted from rocks found in the Earth's crust.

(i) Iron is extracted from iron oxide.
The iron oxide, Fe_2O_3, is heated with carbon.

Complete the balancing of the equation for this reaction by putting numbers in the spaces provided.

(2)

$$2Fe_2O_3 + 3C \rightarrow \ldots\ldots Fe + \ldots\ldots CO_2$$

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

(1)

When the iron oxide reacts with carbon to form iron and carbon dioxide

☒ **A** carbon is reduced and iron oxide is reduced

☒ **B** carbon is oxidised and iron oxide is oxidised

☒ **C** carbon is reduced and iron oxide is oxidised

☒ **D** carbon is oxidised and iron oxide is reduced

(b) Gold is used to make some items of jewellery.

Gold alloys, rather than pure gold, are often used in items of jewellery.

The table shows some information about the properties of two types of gold.

type of gold / carats	relative strength	cost / £ / g
18	medium	16
24	low	22

Use the information in the table to explain why gold alloys, rather than pure gold, are often used in items of jewellery.

(2)

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(c) The table shows four metals in the order in which they appear in the reactivity series, from the most to the least reactive.

The methods of extraction for three of these metals from their ores are given.

metal	method of extraction
sodium	
aluminium	electrolysis
iron	heating with carbon
gold	found uncombined

(i) Suggest the method used to extract sodium from its ore.

(1)

.....

(ii) Explain why this method has to be used.

(2)

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(d) Shape memory alloy tubes can be used in modern surgery as stents to repair damaged blood vessels.

Explain what is meant by a **shape memory alloy.**

(2)

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(Total for Question 4 = 10 marks)

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Fuels

5 Crude oil is fractionally distilled to produce fractions.
These fractions have many uses.

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

(1)

The fraction least likely to be used as a fuel is

☒ **A** bitumen

☒ **B** diesel oil

☒ **C** kerosene

☒ **D** gases

(b) Some of the fractions from crude oil are cracked.

(i) Describe what is meant by **cracking**.

(2)

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(ii) When butane is cracked, a number of different hydrocarbons are formed.

Draw the structure of a molecule of one of these hydrocarbons, showing all bonds.

(2)

*(c) The following passage gives some information about hydrogen used as fuel in cars.

> The fuel used in some cars is hydrogen. It is stored in pressurised tanks underneath the cars. The processes used to produce the hydrogen and pressurise it may require the use of fossil fuels.
>
> The company expects sales of these cars to increase as more hydrogen filling stations are built.

Use your knowledge of hydrogen and petrol to explain the advantages and disadvantages of using hydrogen rather than petrol as the fuel in cars.

(6)

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(Total for Question 5 = 11 marks)

Rocks

6 Calcium carbonate is an important raw material in the chemical industry.

(a) Which of these is not made in a process using calcium carbonate?

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

(1)

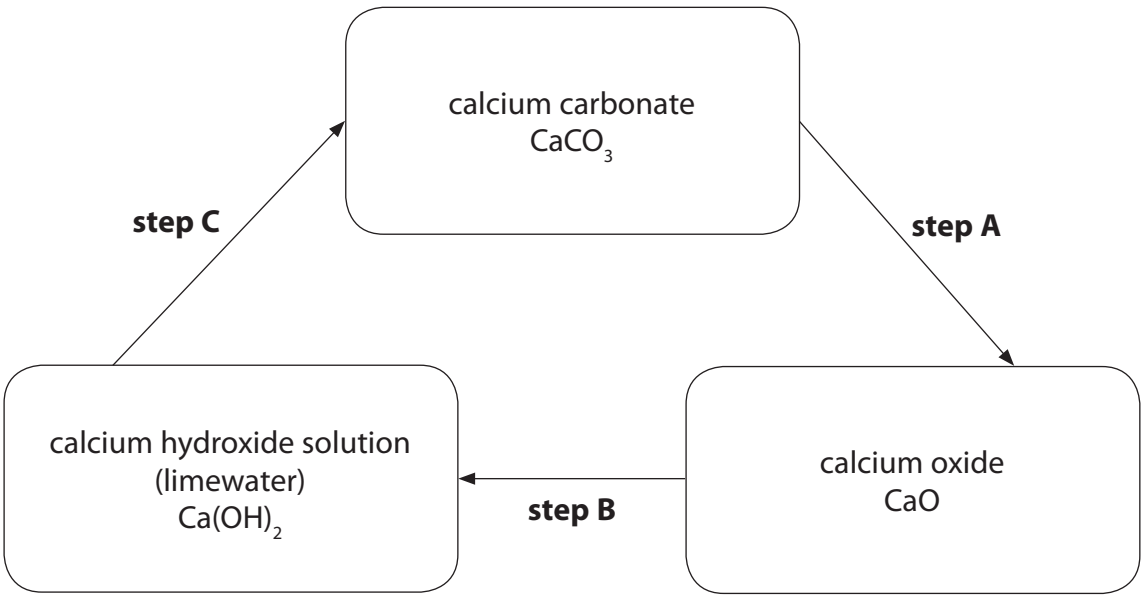
☒ **A** cement

☒ **B** concrete

☒ **C** glass

☒ **D** PVC

(b) The diagram shows reactions of some calcium compounds.



(i) In step **A**, a known mass of calcium carbonate is heated in order to obtain calcium oxide.
The mass of the calcium oxide formed is found.

Suggest how to continue the experiment to prove that the reaction is complete.

(3)

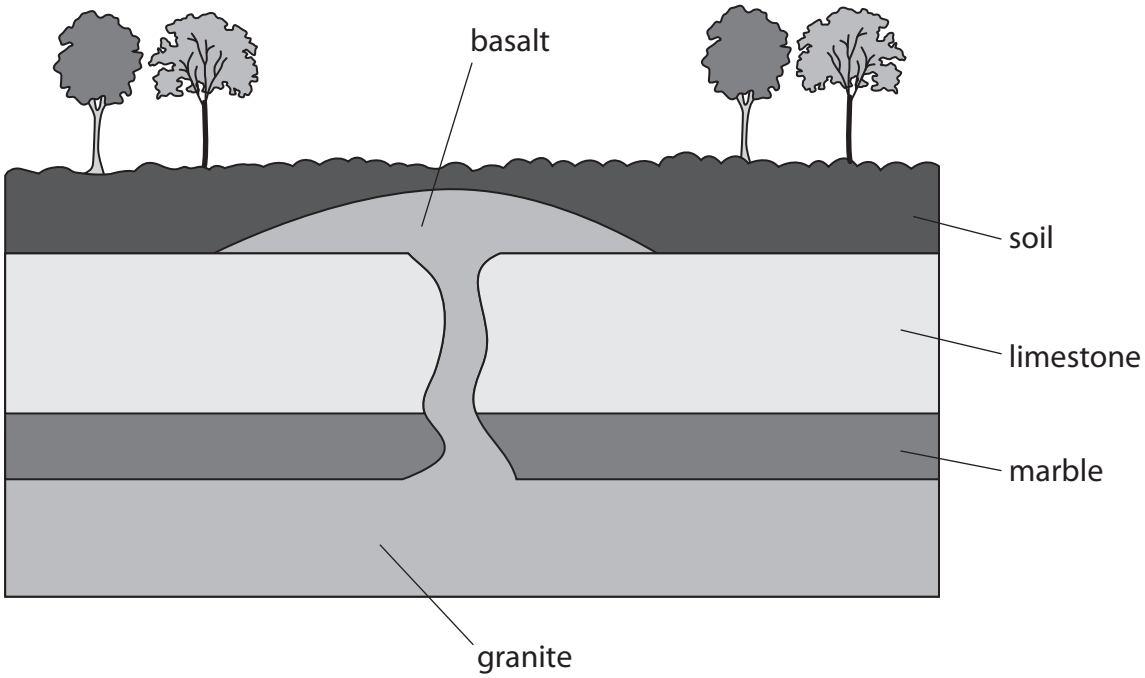
(ii) The reaction in step **C** is the one that occurs in the test for carbon dioxide.

Write the balanced equation for the reaction of calcium hydroxide with carbon dioxide.

(2)

*(c) The diagram shows where the following rocks can be formed in the Earth's crust.

limestone, a sedimentary rock
marble, a metamorphic rock
basalt, an igneous rock consisting of small crystals
granite, an igneous rock consisting of large crystals



Explain how these rocks were formed.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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