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 15 May 2014 – 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.
- 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 3 4 2 7 R 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.

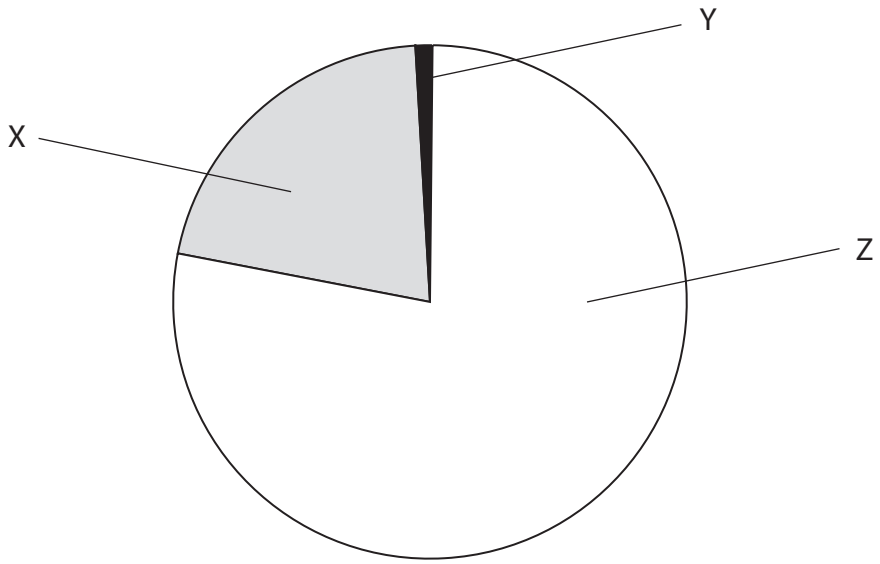
Answer ALL questions

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 ☒.

The Earth's atmosphere

1 The Earth's atmosphere today contains a mixture of different gases.

(a) The pie chart shows the percentages of nitrogen, oxygen and other gases in the atmosphere.



Which row of the table identifies X, Y and Z correctly?

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

(1)

	X	Y	Z
☒ **A**	oxygen	nitrogen	other gases
☒ **B**	other gases	oxygen	nitrogen
☒ **C**	oxygen	other gases	nitrogen
☒ **D**	nitrogen	other gases	oxygen

(b) (i) The percentage of oxygen in the atmosphere has increased since the Earth's earliest atmosphere.

Describe the process that has caused this change.

(2)

.....

.....

.....

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

(2)

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.....

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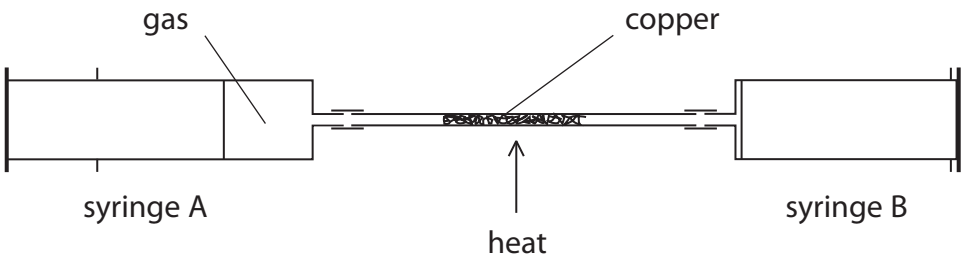
(c) This apparatus is used to find the volume of oxygen in 100 cm^3 of air.



When heated, copper reacts with oxygen in the air to form copper oxide.

Syringe A contains 100 cm^3 of air, syringe B contains no air.
The hard glass tube contains excess copper.
The copper is heated strongly and the air is passed backwards and forwards over the copper until no more copper reacts.
The apparatus is then left to cool.

(i) State why an excess of copper must be used.

(1)

.....

.....

.....

(ii) Explain how this experiment can be used to find the volume of oxygen in 100 cm^3 of air.

(2)

.....

.....

.....

.....

(Total for Question 1 = 8 marks)

Materials from the Earth

2 (a) Limestone and marble are naturally occurring forms of calcium carbonate.

(i) Which of the following is the formula of calcium carbonate?

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

(1)

☐ **A** CaCO

☐ **B** $CaCO_2$

☐ **C** $CaCO_3$

☐ **D** $CaCO_4$

(ii) Give a large scale use of limestone.

(1)

.....

.....

(iii) Marble is an example of a metamorphic rock.

Explain how marble is formed from limestone.

(2)

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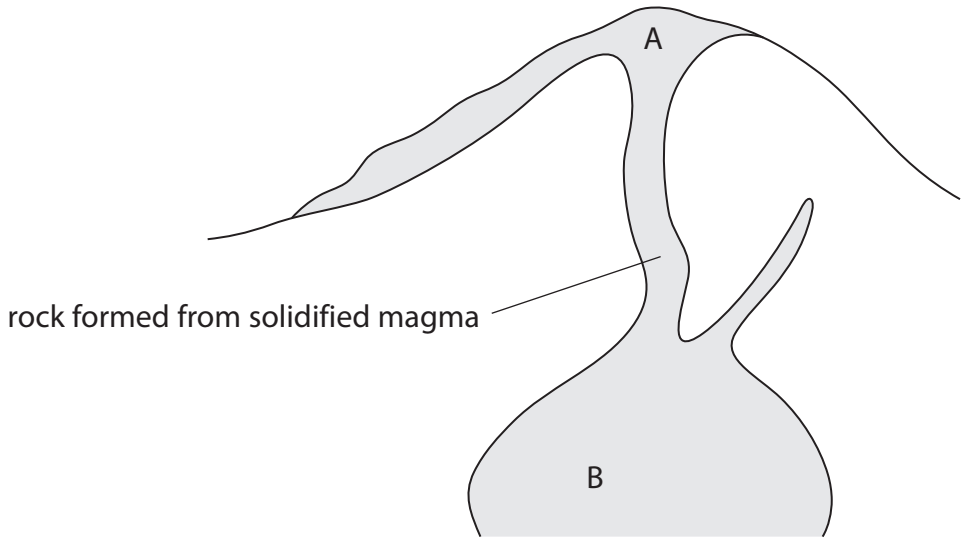
(b) The diagram shows a cross-section through an extinct volcano.



Millions of years ago, molten magma pushed up to the Earth's surface.

The magma cooled and solidified to form rock.

The rock at A and the rock at B differ in appearance.

(i) Describe the appearance of the rock at A and the rock at B.

(1)

.....

.....

.....

(ii) Describe how the magma cooled in different ways to form the rock at A and the rock at B.

(1)

.....

.....

.....

(c) When calcium carbonate is heated calcium oxide is formed.

Calcium oxide reacts with water to form calcium hydroxide.

Write the balanced equation for the reaction of calcium oxide with water to form calcium hydroxide.

(2)

.....

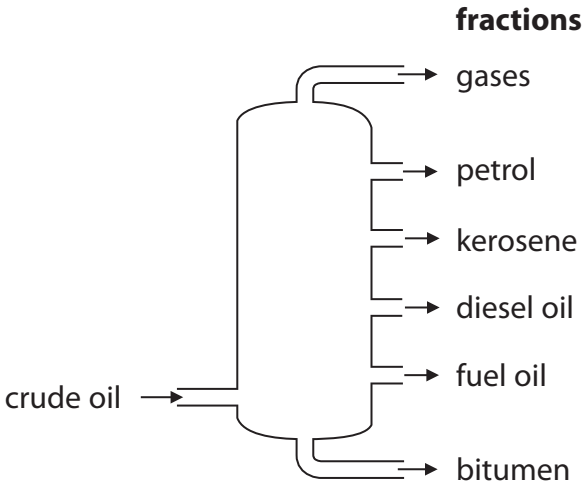
(Total for Question 2 = 8 marks)

Fuels

3 Crude oil is a mixture of hydrocarbons.

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

The diagram shows a fractional distillation column and the fractions.



There are trends in the properties of the fractions from the top of the column to the bottom of the column.

Which of the following describes a correct trend from top of the column to the bottom?

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

(1)

☒ **A** the boiling points decrease

☒ **B** the ease of ignition decreases

☒ **C** the viscosity decreases

☒ **D** the number of carbon atoms in a molecule decreases

(b) Describe problems caused by one product of the incomplete combustion of a hydrocarbon fuel.

(2)

.....

.....

.....

.....

(c) (i) When fuel oil is burnt, carbon dioxide is produced and released into the atmosphere.

Explain why some people are concerned about the release of large quantities of carbon dioxide into the atmosphere.

(2)

(ii) Fuel oil can contain sulfur as an impurity.

Explain how burning this impurity can cause problems in the environment.

(3)

(d) Crude oil is a source of many fuels.

These fuels are known as fossil fuels.

Describe advantages of replacing fossil fuels with biofuels.

(2)

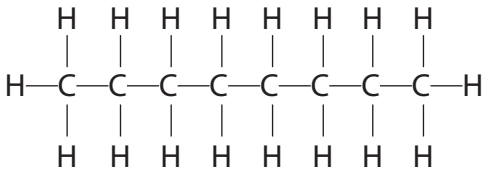
(Total for Question 3 = 10 marks)

Fuels

4 (a) Petrol is obtained by the fractional distillation of crude oil.

One substance present in petrol is octane, C_8H_{18}.

The structure of a molecule of octane is shown.



(i) Octane is a saturated hydrocarbon.

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

(3)

(ii) Octane is mixed with bromine water and shaken.

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

On shaking, the colour of the mixture

(1)

☒ **A** remains orange

☒ **B** remains colourless

☒ **C** changes from clear to orange

☒ **D** changes from orange to colourless

(b) In the oil industry some fuel oil fraction is converted into petrol.

This is done by heating the fuel oil fraction to thermally decompose it and produce smaller molecules.

(i) State the name given to this process.

(1)

.....

(ii) Give **two** reasons why it is necessary to carry out this process to make more petrol.

(2)

reason 1 .....

.....

reason 2 .....

.....

(c) Methane can be burned in excess oxygen to form carbon dioxide and water.

Write the balanced equation for this reaction.

(3)

.....

(Total for Question 4 = 10 marks)

Acids

5 (a) Magnesium carbonate reacts with dilute nitric acid.

Give the names of the products formed in this reaction.

(2)

.....

(b) Zinc oxide, ZnO, reacts with dilute hydrochloric acid to form zinc chloride, $ZnCl_2$, and water.

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

This reaction is an example of

(1)

☒ **A** combustion

☒ **B** thermal decomposition

☒ **C** neutralisation

☒ **D** oxidation

(ii) Write the balanced equation for the reaction between zinc oxide and dilute hydrochloric acid.

(3)

.....

*(c) Electrolysis of hydrochloric acid can produce hydrogen and chlorine.

The apparatus for the electrolysis is

hydrochloric acid

two carbon rods

a suitable container for the electrolysis reaction

a suitable source of electricity

test tubes

Describe how the apparatus can be used to electrolyse hydrochloric acid and how the gases produced can be tested to show that they are hydrogen and chlorine.

You may use a diagram to help your answer.

(6)

(Total for Question 5 = 12 marks)

Metals

6 (a) In the extraction of tin from tin oxide, tin oxide is heated with carbon.

$$SnO_2 + C \rightarrow Sn + CO_2$$

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

When the tin oxide reacts with carbon to form the products

(1)

☒ **A** tin is oxidised

☒ **B** tin oxide is reduced

☒ **C** carbon is reduced

☒ **D** carbon dioxide is oxidised

(b) Pure gold is too soft to be used for some jewellery.

(i) Gold alloys contain other metals such as copper and silver.

In terms of the arrangement of metal atoms, explain why gold alloys are stronger than pure gold.

(2)

.....

.....

.....

.....

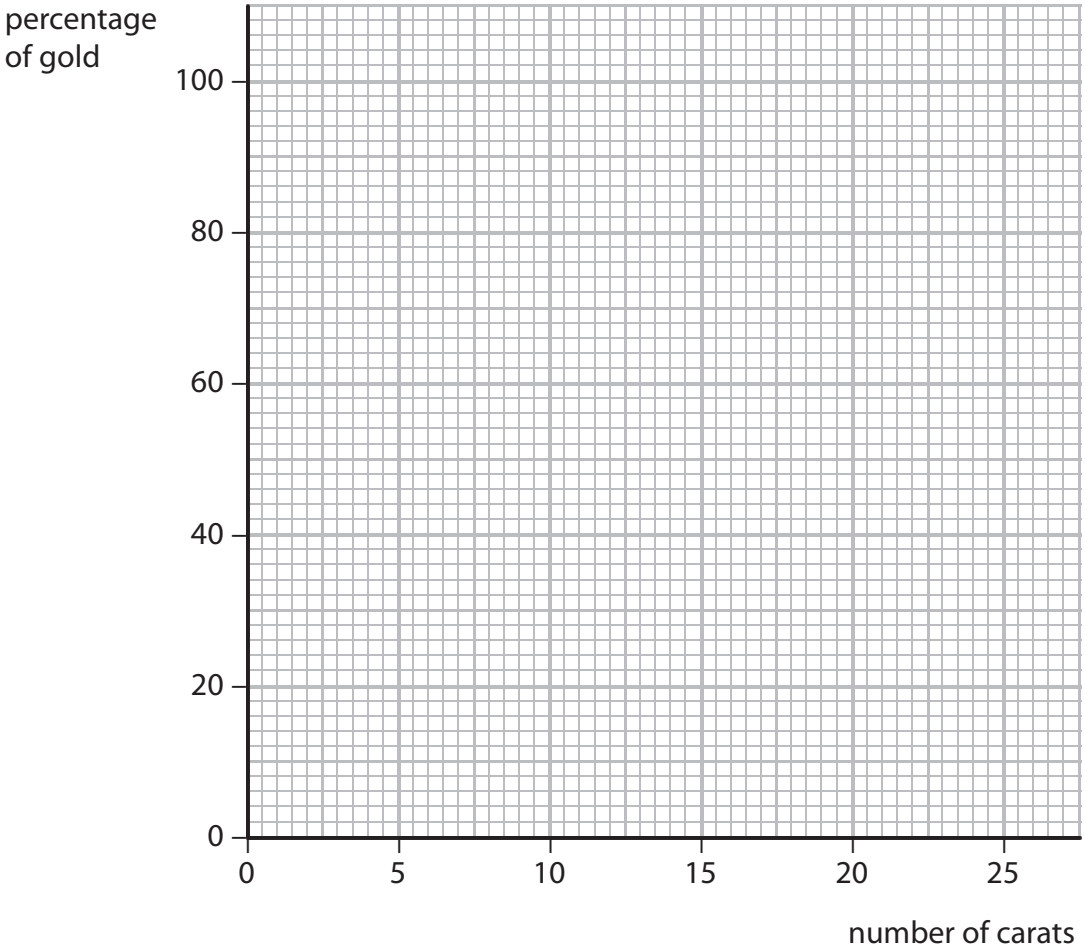
(ii) The purity of gold is often measured in carats.

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

number of carats	percentage of gold
24	100
22	92
18	75
9	38

On the grid provided, draw a graph of the percentage of gold against the number of carats.

(2)



(iii) A gold ring is 14 carat gold.

Use the graph to determine the percentage of gold in the ring.

(1)

.....

*(c) Metals are obtained from the Earth's crust by different methods.

Some metals are found uncombined but others have to be extracted from their ores by electrolysis or by heating the ore with carbon.

Explain, using aluminum, gold and iron as examples, how the method used to obtain the metal is related to its position in the reactivity series and to the cost of the extraction process.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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