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 14 May 2015 – 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 4 6 8 2 A 0 1 2 4

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 ☒.

Limestone

1 Limestone is a sedimentary rock.

(a) Describe how sedimentary rocks, such as limestone, are formed.

(3)

(b) Limestone in the Earth's crust is converted into marble by the action of heat and pressure.

State the type of rock formed.

(1)

(c) Limestone is a natural form of calcium carbonate.

A piece of calcium carbonate is heated strongly.
It forms solid calcium oxide and a gas.
The masses of the solids before and after heating were found.

mass of calcium carbonate before heating = 3.75 g
mass of calcium oxide remaining after heating = 2.10 g

(i) Calculate the mass of gas that was given off.

(1)

.....

mass of gas given off = ... g

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

The gas given off when calcium carbonate is heated is

(1)

☒ **A** carbon

☒ **B** oxygen

☒ **C** carbon monoxide

☒ **D** carbon dioxide

(d) Calcium carbonate and calcium hydroxide are both used by farmers to treat some soils.

Explain why calcium carbonate and calcium hydroxide are used in this way.

(2)

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(Total for Question 1 = 8 marks)

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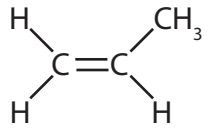
Propene

2 The structure of a molecule of propene is



(a) Propene is an unsaturated hydrocarbon.

(i) Explain what is meant by **unsaturated hydrocarbon**.

(3)

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

Propene can be made by using heat to decompose large alkane molecules into smaller, more useful molecules.

This process is known as

(1)

☒ **A** combustion

☒ **B** cracking

☒ **C** fractional distillation

☒ **D** polymerisation

(iii) Describe what is seen when a sample of propene is shaken with bromine water.

(2)

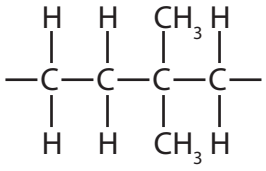
(b) Molecules of propene can be combined to form a molecule of poly(propene).

(i) Which of these shows part of the structure of a molecule of poly(propene)?

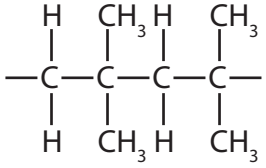
Put a cross (☒) in the box next to your answer.

(1)

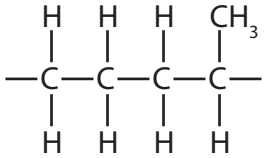
☒ **A**



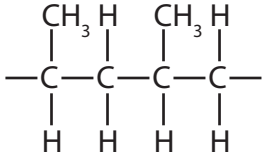
☒ **B**



☒ **C**



☒ **D**



(ii) Ropes used on boats are often made from poly(propene).

State a property of poly(propene) that makes it suitable for use as ropes on boats.

(1)

.....

(iii) State a problem caused by the disposal of poly(propene) ropes in landfill sites.

(1)

.....

.....

.....

(Total for Question 2 = 9 marks)

The atmosphere

3 The Earth's atmosphere today has changed, when compared with the Earth's earliest atmosphere.

(a) Two processes that caused changes were the cooling of the atmosphere and photosynthesis.

(i) State how cooling changed the composition of the Earth's atmosphere.

(1)

.....

.....

(ii) Explain how photosynthesis changed the composition of the Earth's atmosphere.

(2)

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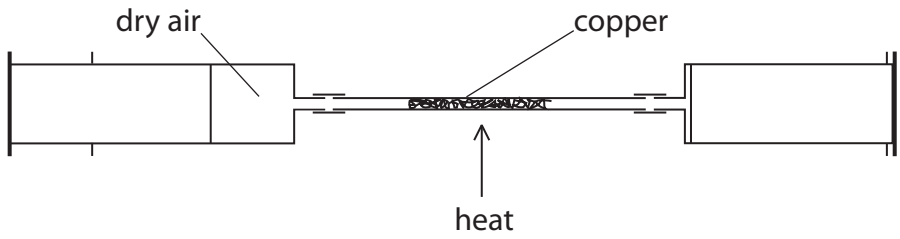
(b) In an experiment, dry air is passed backwards and forwards over hot, excess copper in the apparatus shown.

The oxygen in the air reacts with the hot copper to form copper oxide, CuO.



(i) Write the balanced equation for the reaction of copper with oxygen.

(3)

.....

(ii) When the copper has reacted with all the oxygen, the apparatus is allowed to cool.

The initial volume of dry air in the apparatus was 50 cm^3, measured at room temperature and pressure.
During the experiment the volume of gas in the apparatus decreased.

Calculate the final volume of gas remaining in the apparatus after allowing it to cool to room temperature.
(percentage of oxygen in dry air is 21%)

(2)

.....

.....

.....

.....

final volume of gas remaining in apparatus = ... cm^3

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

After the reaction between dry air and copper is complete, most of the gas remaining in the apparatus is

(1)

☒ **A** argon

☒ **B** carbon dioxide

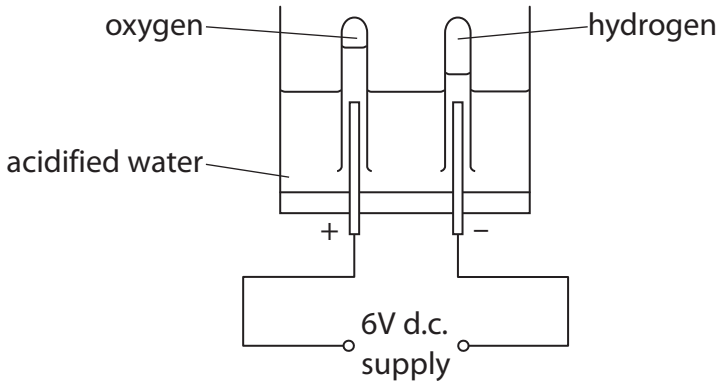
☒ **C** nitrogen

☒ **D** oxygen

(Total for Question 3 = 9 marks)

Electrolysis and acids

4 (a) Water, acidified with a small amount of dilute sulfuric acid, can be decomposed by electrolysis using the apparatus shown.



(i) State the form of energy used to carry out the electrolysis.

(1)

.....

(ii) During the electrolysis, hydrogen is formed at one of the electrodes.

Describe a test to show that this gas is hydrogen.

(2)

.....

.....

.....

.....

(b) Electrolysis is also used to produce chlorine on a large scale.

Name a raw material that can be electrolysed to produce chlorine.

(1)

.....

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

Acids are neutralised by metal hydroxides to form

(1)

☒ **A** salt only

☒ **B** salt and hydrogen only

☒ **C** salt and oxygen only

☒ **D** salt and water only

(ii) Acids can also be neutralised by metal carbonates.

Dilute sulfuric acid is neutralised by copper carbonate as shown in the word equation.

copper carbonate + sulfuric acid → copper sulfate + carbon dioxide + water

Copper carbonate is a green powder.

Describe what you would **see** when copper carbonate powder is added to dilute sulfuric acid.

(2)

.....

.....

.....

.....

(d) Two experiments were carried out to test the effectiveness of tablets of three different indigestion remedies, A, B and C.

For each remedy, the experiments were carried out on both a whole and a crushed tablet.

In experiment 1, each tablet was added to excess hydrochloric acid and the time taken for the tablet to react completely was recorded.

In experiment 2, the volume of acid neutralised by each tablet was determined.

The table shows the results obtained for the investigation.

tablet of	state of tablet	experiment 1 : time taken for the tablet to react completely / s	experiment 2 : volume of acid neutralised / cm^3
A	whole	75	25.0
	crushed	30	25.0
B	whole	59	25.0
	crushed	19	25.0
C	whole	120	50.0
	crushed	44	50.0

(i) Explain, using information from the table, which of the tablets contains the most of the active ingredient to overcome indigestion.

(2)

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(ii) Explain, using information from the table, whether faster relief of indigestion is achieved by using a given tablet whole or crushed.

(1)

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(Total for Question 4 = 10 marks)

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Fuels and crude oil

5 (a) Some fuels are better fuels than others.

State one factor that makes a good fuel.

(1)

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.....

(b) Bioethanol is a fuel that can be obtained from the plant, sugar beet.

(i) Bioethanol and petrol can both be used as fuels.

Explain one advantage of using bioethanol produced from sugar beet, rather than petrol produced from crude oil.

(2)

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.....

(ii) The main component of bioethanol is ethanol.

When burnt completely, ethanol, C_2H_5OH, reacts with oxygen to produce carbon dioxide and water.

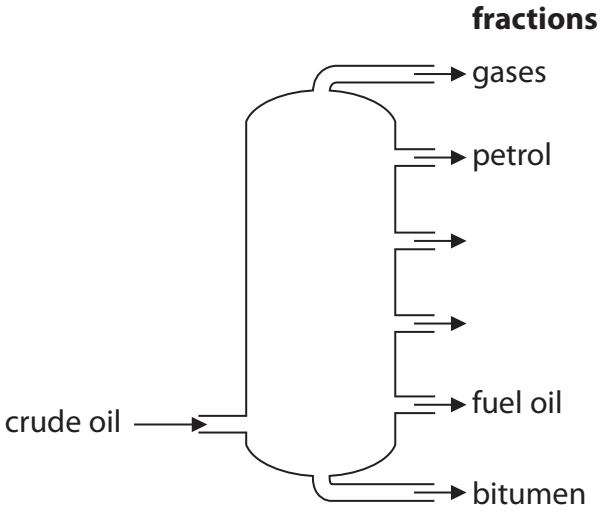
Write the balanced equation for this reaction.

(3)

.....

*(c) Useful products can be obtained by the fractional distillation of crude oil.

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



The petrol fraction is obtained from near the top of the column.
The bitumen fraction is obtained from the bottom of the column.

Explain how the petrol and bitumen fractions differ in their properties and uses.

(6)

(Total for Question 5 = 12 marks)

Metals

6 The list shows some metals in order of reactivity.

most reactive	sodium
	aluminium
	zinc
	iron
	copper
least reactive	gold

(a) Aluminium and iron are extracted by reduction of their oxides.

State what is meant by reduction.

(1)

.....

.....

(b) Electrolysis and heating with carbon are two methods of reduction.

Explain why aluminium needs to be extracted from its ore by electrolysis, rather than by heating with carbon.

(2)

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.....

(c) Iron is extracted from iron oxide, Fe_2O_3.

In the extraction process the iron oxide is heated with carbon to form iron and carbon dioxide.

Write the balanced equation for this reaction.

(3)

.....

*(d) Pure metal can be converted into alloys.

In many cases alloys are more useful than pure metals, for example they are stronger. Gold alloys, stainless steel and nitinol are examples of useful alloys.

Describe how alloying improves the usefulness of metals and how strength is increased in terms of structure.

You may use diagrams to help your answer.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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