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 January 2018 – 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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P 5 7 5 8 0 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 ☒.

Gases

1 The table shows the composition of the current atmospheres of four planets, **W**, **X**, **Y** and **Z**.
Gases that form less than one per cent of the atmosphere of a planet are not shown.

	percentage of gas in atmosphere of			
	planet W	**planet X**	**planet Y**	**planet Z**
argon	3	2	1	
carbon dioxide	47	96		
helium				6
hydrogen	5			22
nitrogen	33	2	78	
oxygen	12		21	42
sodium				30

One of the planets is Earth.

(a) Which of the planets is Earth?

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

(1)

☒ **A** planet **W**

☒ **B** planet **X**

☒ **C** planet **Y**

☒ **D** planet **Z**

(b) The composition of the Earth's early atmosphere was very different from the composition of the Earth's atmosphere today.
One of the planets has an atmosphere similar to that of the Earth's **early** atmosphere.

Explain which planet has an atmosphere similar to that of the Earth's early atmosphere.

(2)

letter of planet .....

explanation .....

.....

.....

(c) (i) Hydrogen, H_2, reacts with oxygen, O_2, to form water, under appropriate conditions.

Write the balanced equation for this reaction.

(2)

.....

(ii) This reaction can be carried out in the laboratory by igniting a mixture of hydrogen and air in a test tube.

Give one observation for this reaction.

(1)

.....

(d) Carbon dioxide is a gas in the atmosphere that helps to keep the Earth warm.

(i) Give the name of another gas in the Earth's atmosphere that helps to keep the Earth warm.

(1)

.....

(ii) State how these gases keep the Earth warm.

(1)

.....

.....

.....

(Total for Question 1 = 8 marks)

Rocks

2 Igneous, metamorphic and sedimentary rocks are the three different types of rock in the Earth's crust.

(a) Which of the following are both sedimentary rocks?

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

(1)

☒ **A** chalk and granite

☒ **B** limestone and chalk

☒ **C** marble and granite

☒ **D** marble and limestone

(b) Igneous rocks can contain different sized crystals.
Rock **S** consists of big crystals and rock **T** consists of small crystals.

Explain, by referring to their different sized crystals, how these two igneous rocks were formed.

(3)

.....

.....

.....

.....

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.....

.....

(c) Mudstone is a sedimentary rock.
Slate is a metamorphic rock formed from mudstone.

Describe the conditions required to form slate from mudstone.

(2)

.....

.....

.....

.....

(d) Limestone is a natural form of calcium carbonate.
When calcium carbonate is heated strongly, calcium oxide is formed.

Write the balanced equation for this reaction.

(2)

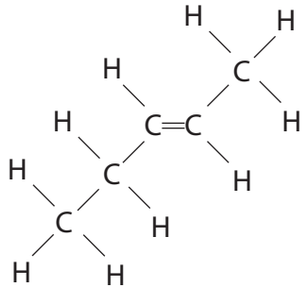
.....

(Total for Question 2 = 8 marks)

Alkenes

3 Alkenes are unsaturated hydrocarbons.

The diagram of an alkene molecule is shown.



(a) Explain how the structure of this alkene molecule shows that it is an **unsaturated hydrocarbon**.

(3)

(b) (i) Draw the structure of a molecule of propene, C_3H_6, showing all covalent bonds.

(2)

(ii) Explain what you would **see** if propene is bubbled through bromine water.

(2)

(c) Propene can be polymerised.

Give the name of the polymer formed when propene is polymerised.

(1)

.....

(d) Complete the balanced equation for the reaction of butene, C_4H_8, with oxygen to form carbon monoxide, CO, and water.

(2)

$C_4H_8 + 4O_2 \rightarrow$ ..... + ...

(Total for Question 3 = 10 marks)

Acids and electrolysis

4 (a) A solution of sodium chloride can be decomposed using electrolysis.
The products formed at the electrodes are chlorine gas and hydrogen gas.

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

(1)

.....

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

(2)

.....

.....

.....

.....

(iii) Which of these is made using chlorine?

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

(1)

☒ **A** bleach

☒ **B** cement

☒ **C** glass

☒ **D** poly(ethene)

(b) Sodium chloride solution can be produced by the reaction of hydrochloric acid with sodium hydroxide solution.

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

The reaction of hydrochloric acid with sodium hydroxide is an example of

(1)

☒ **A** combustion

☒ **B** neutralisation

☒ **C** oxidation

☒ **D** thermal decomposition

(ii) Write the balanced equation for the reaction of hydrochloric acid with sodium hydroxide.

(2)

(c) When water is electrolysed, hydrogen and oxygen gases are formed.
The volumes of hydrogen and oxygen formed are measured at two-minute intervals.
Two experiments are carried out.
In experiment 2 the current used is double the current used in experiment 1.

The results of the two experiments are shown in the table.

time / minutes	experiment 1		experiment 2	
	volume of hydrogen / cm^3	volume of oxygen / cm^3	volume of hydrogen / cm^3	volume of oxygen / cm^3
0	0.0	0.0	0.0	0.0
2	5.0	2.5	10.0	5.0
4	10.0	5.0	20.0	10.0
6	15.0	7.5	30.0	15.0
8	20.0	10.0	40.0	20.0

Use the results to describe the effect of time and current on the volumes of hydrogen and oxygen formed.

(3)

(Total for Question 4 = 10 marks)

Fuels

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

Hydrogen can be used as a fuel in the engines of some vehicles.

An advantage of using hydrogen, rather than petrol, as a fuel for vehicles is that hydrogen

(1)

☒ **A** is not flammable

☒ **B** is a gas

☒ **C** is produced using electricity

☒ **D** produces only water on combustion

(b) Hydrocarbon fuels are obtained from crude oil.
When these fuels are burned sulfur dioxide can be released into the atmosphere.

(i) Explain how sulfur dioxide is formed when the fuels are burned.

(2)

.....

.....

.....

.....

(ii) Sulfur dioxide reacts with rainwater to form sulfurous acid, H_2SO_3.
Sulfurous acid is oxidised by oxygen in the air to form sulfuric acid.

Write the balanced equation for the oxidation of sulfurous acid by oxygen.

(2)

.....

(iii) Give a problem caused by acid rain.

(1)

.....

.....

.....

.....

*(c) Bioethanol is a biofuel and is produced from plants.
Diesel oil is a fossil fuel obtained from crude oil.
Diesel is commonly used as a fuel for buses.

Evaluate the advantages and disadvantages if bioethanol, rather than diesel, is used as a fuel for buses.

(6)

(Total for Question 5 = 12 marks)

Metals

6 (a) Some properties of copper and gold are shown in the table.

metal	cost of 1 kg / £	density / g cm^{-3}	relative strength	resistance to corrosion	ability to conduct electricity
gold	33 000	19.3	low	excellent	excellent
copper	5	8.92	high	good	very good

Very small amounts of gold are used to connect microprocessors and memory chips in some electrical devices, such as mobile phones and computers.

Give **two** reasons why gold is used, rather than copper, in these electrical devices, even though gold is much more expensive than copper.

(2)

reason 1 .....

.....

.....

reason 2 .....

.....

.....

(b) Metals are often alloyed with other metals to increase their strength.

Explain, in terms of their structures, why gold alloys are stronger than pure gold.

(3)

(c) Most metals are extracted by reduction of compounds in their ores.

State what is meant by the term **reduction**.

(1)

*(d) The method of extraction of a metal from its ore depends on the reactivity of the metal and, in some cases, on the cost of the extraction process.

The list shows some metals in the reactivity series from the most reactive at the top to the least reactive at the bottom.

most reactive	magnesium
	aluminium
	zinc
	iron
	copper
least reactive	gold

Aluminium, iron and gold are obtained by different methods.

Describe how the method of obtaining these metals is related to their 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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