

Write your name here

Surname

Other names

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Centre Number

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Candidate Number

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# Chemistry/Science

## Unit C1: Chemistry in Our World

**Foundation Tier**

Thursday 14 May 2015 – 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.
- 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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1/1/1/1/1/



**PEARSON**

# The Periodic Table of the Elements

	1	2	3	4	5	6	7	0	
	7 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4		11 <b>B</b> boron 5	12 <b>C</b> carbon 6	14 <b>N</b> nitrogen 7	16 <b>O</b> oxygen 8	19 <b>F</b> fluorine 9	20 <b>Ne</b> neon 10
	23 <b>Na</b> sodium 11	24 <b>Mg</b> magnesium 12		27 <b>Al</b> aluminium 13	28 <b>Si</b> silicon 14	31 <b>P</b> phosphorus 15	32 <b>S</b> sulfur 16	35.5 <b>Cl</b> chlorine 17	40 <b>Ar</b> argon 18
	39 <b>K</b> potassium 19	40 <b>Ca</b> calcium 20		70 <b>Ga</b> gallium 31	73 <b>Ge</b> germanium 32	75 <b>As</b> arsenic 33	79 <b>Se</b> selenium 34	80 <b>Br</b> bromine 35	84 <b>Kr</b> krypton 36
	85 <b>Rb</b> rubidium 37	88 <b>Sr</b> strontium 38		115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	122 <b>Sb</b> antimony 51	128 <b>Te</b> tellurium 52	127 <b>I</b> iodine 53	131 <b>Xe</b> xenon 54
	133 <b>Cs</b> caesium 55	137 <b>Ba</b> barium 56		204 <b>Tl</b> thallium 81	207 <b>Pb</b> lead 82	209 <b>Bi</b> bismuth 83	[209] <b>Po</b> polonium 84	[210] <b>At</b> astatine 85	[222] <b>Rn</b> radon 86
	[223] <b>Fr</b> francium 87	[226] <b>Ra</b> radium 88		201 <b>Hg</b> mercury 80	204 <b>Pb</b> lead 82	209 <b>Bi</b> bismuth 83	[209] <b>Po</b> polonium 84	[210] <b>At</b> astatine 85	[222] <b>Rn</b> radon 86
				65 <b>Zn</b> zinc 30	63.5 <b>Cu</b> copper 29	59 <b>Ni</b> nickel 28	59 <b>Co</b> cobalt 27	59 <b>Ni</b> nickel 28	65 <b>Zn</b> zinc 30
				112 <b>Cd</b> cadmium 48	108 <b>Ag</b> silver 47	106 <b>Pd</b> palladium 46	103 <b>Rh</b> rhodium 45	106 <b>Pd</b> palladium 46	112 <b>Cd</b> cadmium 48
				197 <b>Au</b> gold 79	197 <b>Au</b> gold 79	195 <b>Pt</b> platinum 78	192 <b>Ir</b> iridium 77	195 <b>Pt</b> platinum 78	201 <b>Hg</b> mercury 80
				[272] <b>Rg</b> roentgenium 111	[272] <b>Rg</b> roentgenium 111	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[277] <b>Hs</b> hassium 108	[277] <b>Hs</b> hassium 108	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[264] <b>Bh</b> bohrium 107	[264] <b>Bh</b> bohrium 107	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Sg</b> seaborgium 106	[266] <b>Sg</b> seaborgium 106	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[262] <b>Db</b> dubnium 105	[262] <b>Db</b> dubnium 105	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[261] <b>Rf</b> rutherfordium 104	[261] <b>Rf</b> rutherfordium 104	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[227] <b>Ac*</b> actinium 89	[227] <b>Ac*</b> actinium 89	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[226] <b>Ra</b> radium 88	[226] <b>Ra</b> radium 88	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[227] <b>La*</b> lanthanum 57	[227] <b>La*</b> lanthanum 57	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[262] <b>Ta</b> tantalum 73	[262] <b>Ta</b> tantalum 73	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[261] <b>Hf</b> hafnium 72	[261] <b>Hf</b> hafnium 72	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[262] <b>Nb</b> niobium 41	[262] <b>Nb</b> niobium 41	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[261] <b>Zr</b> zirconium 40	[261] <b>Zr</b> zirconium 40	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[262] <b>Ti</b> titanium 22	[262] <b>Ti</b> titanium 22	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[262] <b>V</b> vanadium 23	[262] <b>V</b> vanadium 23	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Cr</b> chromium 24	[266] <b>Cr</b> chromium 24	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[98] <b>Tc</b> technetium 43	[98] <b>Tc</b> technetium 43	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[264] <b>Mn</b> manganese 25	[264] <b>Mn</b> manganese 25	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[277] <b>Fe</b> iron 26	[277] <b>Fe</b> iron 26	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[268] <b>Ru</b> ruthenium 44	[268] <b>Ru</b> ruthenium 44	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Rh</b> rhodium 45	[266] <b>Rh</b> rhodium 45	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Pd</b> palladium 46	[266] <b>Pd</b> palladium 46	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Ag</b> silver 47	[266] <b>Ag</b> silver 47	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Cd</b> cadmium 48	[266] <b>Cd</b> cadmium 48	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>In</b> indium 49	[266] <b>In</b> indium 49	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Sn</b> tin 50	[266] <b>Sn</b> tin 50	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Sb</b> antimony 51	[266] <b>Sb</b> antimony 51	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Te</b> tellurium 52	[266] <b>Te</b> tellurium 52	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>I</b> iodine 53	[266] <b>I</b> iodine 53	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Xe</b> xenon 54	[266] <b>Xe</b> xenon 54	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Bi</b> bismuth 83	[266] <b>Bi</b> bismuth 83	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Po</b> polonium 84	[266] <b>Po</b> polonium 84	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>At</b> astatine 85	[266] <b>At</b> astatine 85	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111
				[266] <b>Rn</b> radon 86	[266] <b>Rn</b> radon 86	[271] <b>Ds</b> darmstadtium 110	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111

1 <b>H</b> hydrogen 1
--------------------------------

Key  
relative atomic mass  
atomic symbol  
name  
atomic (proton) number

Elements with atomic numbers 112-116 have been reported but not fully authenticated

\* 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 . If you change your mind about an answer, put a line through the box  and then mark your new answer with a cross .

**Rocks**

1 Rocks can be described as igneous, metamorphic, or sedimentary.

(a) The photograph shows a sample of igneous rock.



© Geology.com

Describe how igneous rocks are formed.

(2)

.....

.....

.....

.....

(b) The table shows characteristics of three rocks, A, B and C.

rock	fossils	layers	easily eroded
<b>A</b>	no	no	no
<b>B</b>	yes	yes	yes
<b>C</b>	no	yes	no

Give the letter of the rock that is likely to be sedimentary.

(1)

.....



(c) Limestone is a naturally occurring form of calcium carbonate.

When calcium carbonate is heated strongly, it decomposes to form calcium oxide and carbon dioxide.

(i) Write the word equation for this reaction. (2)



(ii) Water is added, a drop at a time, to a lump of cold calcium oxide.  
Describe what is **seen** as the water is added. (2)

.....  
.....  
.....  
.....

(d) In the Earth's crust, limestone can change into a metamorphic rock by the action of heat and high pressure.

Give the name of the metamorphic rock formed. (1)

.....

**(Total for Question 1 = 8 marks)**



## Atmosphere

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

The Earth's earliest atmosphere is thought to have been formed by

(1)

- A animals breathing
- B photosynthesis in plants
- C the oceans cooling
- D gases from volcanoes

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

The Earth's earliest atmosphere contained large amounts of carbon dioxide.

The percentage of carbon dioxide in the Earth's atmosphere today is

(1)

- A less than 1%
- B 5%
- C 21%
- D 78%

- (ii) Write the formula of a molecule of carbon dioxide.

(1)

- (iii) The percentage of carbon dioxide in the atmosphere has decreased since the Earth's earliest atmosphere.

Explain what has caused the amount of carbon dioxide in the atmosphere to decrease.

(2)

- (iv) State one human activity that increases the amount of carbon dioxide in the atmosphere today.

(1)



(v) Describe the test to show that a gas is carbon dioxide.

(2)

.....

.....

.....

**(Total for Question 2 = 8 marks)**



## Hydrochloric acid

3 Hydrochloric acid is present in the stomach to help digestion.

(a) State another effect hydrochloric acid has in the stomach.

(1)

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

Indigestion can occur when excess acid is present in the stomach.

To relieve the pain caused by indigestion, people take indigestion tablets.

Indigestion tablets in the stomach

(1)

- A dilute the excess acid
- B neutralise the excess acid
- C polymerise the excess acid
- D oxidise the excess acid

(c) Some indigestion remedies contain magnesium hydroxide.

Which of the following substances is formed when magnesium hydroxide reacts with hydrochloric acid in the stomach?

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

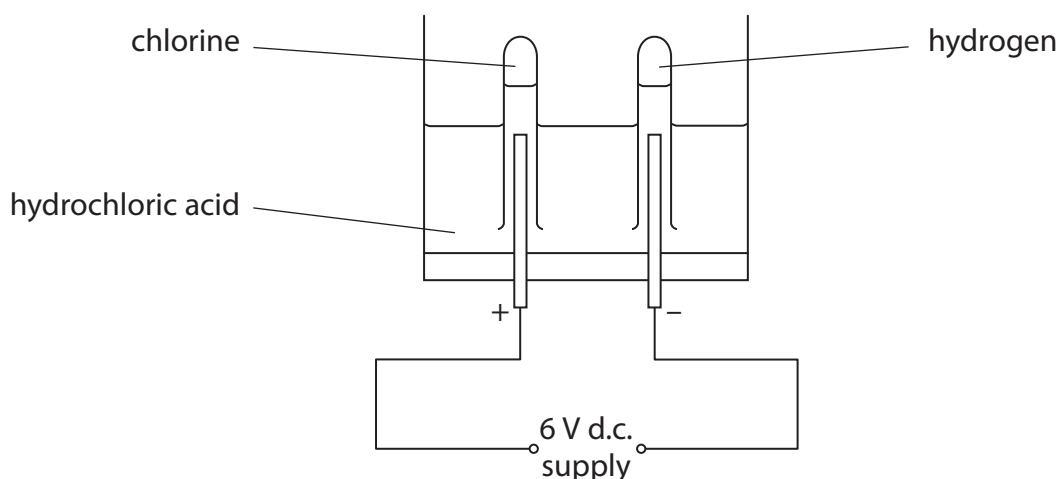
(1)

- A magnesium chloride
- B magnesium carbonate
- C magnesium nitrate
- D magnesium sulfate





(d) Hydrochloric acid can be used to make chlorine in the apparatus shown.



(i) The experiment shown is an example of electrolysis.

Explain the meaning of **electrolysis**.

(2)

.....

.....

.....

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

(2)

.....

.....

.....

(iii) Great care has to be taken when chlorine is manufactured on a large scale.

Explain the potential hazards of storing large volumes of chlorine.

(2)

.....

.....

.....

(iv) State a large-scale use of chlorine.

(1)

.....

(Total for Question 3 = 10 marks)



## Hydrocarbons

4 (a) The table shows the name and structure of four different organic molecules.

name	structure
ethanol	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$
ethene	$\begin{array}{c} \text{H} \quad \quad \text{H} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H} \quad \quad \text{H} \end{array}$
methane	$\begin{array}{c} \text{H} \\   \\ \text{H}-\text{C}-\text{H} \\   \\ \text{H} \end{array}$
propane	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\   \quad   \quad   \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\   \quad   \quad   \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$

Use the information in the table to answer the following questions.  
Each of the molecules can be used once, more than once, or not at all.

(i) Give the name of the molecule that is **not** a hydrocarbon.

(1)

(ii) Give the name of the molecule that is unsaturated.

(1)

(iii) Give the name of the molecule that is used as a monomer in a polymerisation reaction.

(1)



(b) Bromine water is used to distinguish between alkenes and alkanes.

Describe what would be **seen** when an alkene and an alkane are shaken with separate samples of bromine water.

(3)

alkene.....  
.....

alkane.....  
.....

(c) PTFE (poly(tetrafluoroethene)) is a polymer used to coat some frying pans.



Give **two** reasons why PTFE is used as a coating for frying pans.

(2)

reason 1.....  
.....

reason 2.....  
.....

(d) The disposal of items made of polymers can cause problems.

Explain **one** of the problems associated with the disposal of these items.

(2)

.....  
.....  
.....  
.....

(Total for Question 4 = 10 marks)



## Renewable fuels

5 Bioethanol and hydrogen are fuels that can be used instead of fossil fuels.

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

All fuels **must**

- A** be liquid at room temperature (1)
- B** burn slowly
- C** produce heat energy when they burn
- D** produce no waste gases when they burn

(b) Hydrogen is used as a fuel in the engines of some vehicles.

In these engines hydrogen reacts with oxygen to form water.

(i) Write the word equation for this reaction. (2)

(ii) State one advantage of using hydrogen, rather than petrol, as a fuel for vehicles. (1)

(iii) Explain one disadvantage of using hydrogen as a fuel for vehicles. (2)





## Iron and steel

- 6 (a) Iron can be extracted from a naturally occurring substance called haematite.

State the name given to the naturally occurring substances from which metals are extracted.

(1)

- (b) In the extraction of iron, iron oxide is heated with carbon to form iron.  
A gas is also formed.

Write the word equation for this reaction.

(2)

- (c) The table shows information about iron and two alloy steels.

metallic substance	density / kg m <sup>-3</sup>	relative cost per tonne	relative strength	resistance to rusting
iron	7850	low	low	low
high speed steel	7850	high	very high	high
stainless steel	7480 – 8000	high	very high	high

Use the information from the table to suggest reasons why iron is converted to these alloy steels.

(2)



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

When iron nails are left exposed to air and water, the iron reacts to form rust.

In this reaction, iron is

(1)

- A** oxidised
- B** crystallised
- C** neutralised
- D** reduced



\***(e)** Metals are extracted by different methods which are linked to their position in the reactivity series of metals.

Iron is extracted from iron oxide by heating with carbon.

Gold is found uncombined in the Earth's crust.

Aluminium is extracted from aluminium oxide using electrolysis.

The list shows part of the reactivity series with iron, gold and aluminium missing.

calcium  
magnesium

.....  
zinc

.....  
tin  
lead

.....

Use the information given about the methods of extracting these metals to explain where in this reactivity series iron, gold and aluminium are placed.

**(6)**

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Handwriting practice area with 25 horizontal dotted lines.

**(Total for Question 6 = 12 marks)**

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**TOTAL FOR PAPER = 60 MARKS**



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