Write your name here

| Surname | Other names |
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| | |

**Edexcel GCSE**

| Centre Number | Candidate Number |
|---|---|
| | |

# Chemistry/Science

## Unit C1: Chemistry in Our World

**Foundation Tier**

| Monday 21 May 2012 – Morning<br>**Time: 1 hour** | Paper Reference<br>**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* ▶

P40239A

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1/1/1/1/

P 4 0 2 3 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.***

P 4 0 2 3 9 A 0 2 2 0

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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 ☒.**

## Iron

**1** Iron occurs in the Earth's crust as an ore.



iron ore

The ore is mainly iron oxide, $Fe_2O_3$.

(a) Give the name of the element combined with iron in iron oxide.

**(1)**

.....

(b) When iron oxide is heated with carbon, the products are iron and carbon dioxide.

(i) Complete the word equation for this reaction.

**(2)**

iron oxide + ..... → iron + .....

(ii) What happens to the iron oxide during this reaction?

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

**(1)**

☒ **A** the iron oxide burns

☒ **B** the iron oxide is neutralised

☒ **C** the iron oxide is oxidised

☒ **D** the iron oxide is reduced

(c) Iron corrodes when it is left in moist air.

This list shows iron and three other metals in reactivity series order, with the most reactive metal at the top.

| | |
|---|---|
| most reactive | magnesium |
| | iron |
| | lead |
| least reactive | silver |

Explain which metal in the list will corrode faster than iron.

**(2)**

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.....

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(d) Stainless steel is an alloy containing iron and chromium.

(i) State the meaning of the term **alloy**.

**(1)**

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(ii) Cutlery is made of stainless steel.

Give a reason why cutlery is not made of pure iron.

**(1)**

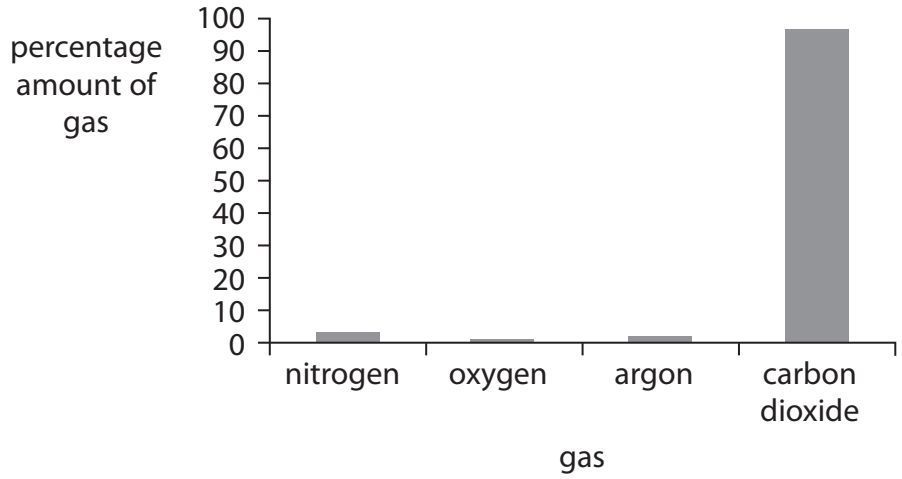
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**(Total for Question 1 = 8 marks)**

**The Earth's atmosphere**

**2** The amounts of some gases in the Earth's early atmosphere are shown on the bar chart.




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

The earth's earliest atmosphere was formed by

**(1)**

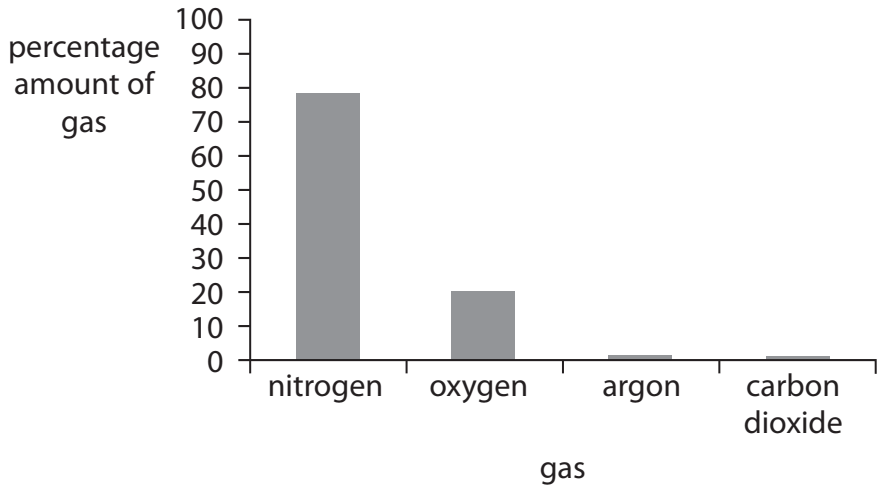
☒ **A** animals breathing

☒ **B** trees burning

☒ **C** plants photosynthesising

☒ **D** volcanoes erupting

(b) The amounts of some gases in the atmosphere on Earth today are shown on this bar chart.




Which gas has decreased by the largest amount from the Earth's early atmosphere to the atmosphere of the Earth today?

Use this bar chart and the bar chart in (a).

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

**(1)**

☒ **A** argon

☒ **B** carbon dioxide

☒ **C** nitrogen

☒ **D** oxygen

(c) There was also a large amount of water vapour in the Earth's early atmosphere. There is a much smaller amount of water vapour in the atmosphere on Earth today.

Explain how the amount of water in the Earth's atmosphere decreased.

**(2)**

(d) Methane burns in air.

$$\text{methane} + \text{oxygen} \rightarrow \text{carbon dioxide} + \text{water}$$

This causes small changes in the amounts of some gases in today's atmosphere.

Explain why burning methane changes the amounts of gases in the atmosphere.

**(2)**

(e) Apart from burning fossil fuels, state **two** other activities that affect the amounts of gases in the atmosphere.

**(2)**

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

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## Hydrochloric acid

**3** (a) Dilute hydrochloric acid can be used to make salts.
The salts produced are chlorides.

Some copper compounds react with dilute hydrochloric acid to produce copper chloride.

Which of the following compounds will **not** neutralise dilute hydrochloric acid to produce copper chloride?

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

**(1)**

☒ **A** copper carbonate

☒ **B** copper hydroxide

☒ **C** copper oxide

☒ **D** copper sulfate

(b) Use words from the box to complete the word equation for the reaction of magnesium carbonate to produce magnesium chloride.

**(2)**

| | | |
|---|---|---|
| carbon dioxide | hydrochloric acid | nitric acid |
| oxygen | sulphuric acid | |

magnesium carbonate + ..... → magnesium chloride + ..... + water

(c) Indigestion tablets neutralise excess hydrochloric acid in the stomach.
Two tablets, A and B, were tested.

The table shows the cost of each tablet and the volume of hydrochloric acid neutralised by each tablet.

| tablet | cost of one tablet / p | volume of hydrochloric acid neutralised by one tablet / $cm^3$ |
|---|---|---|
| A | 2.5 | 30.6 |
| B | 1.2 | 10.2 |

Explain which tablet, A or B, is the best value for money.

**(2)**

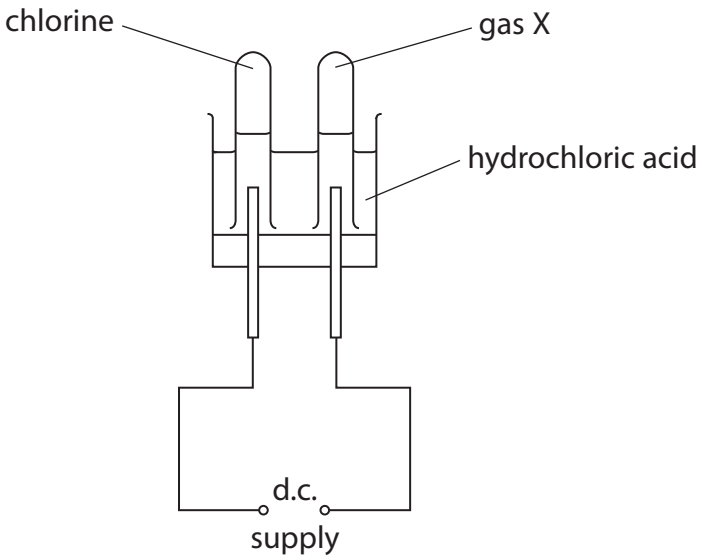
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(d) Hydrochloric acid was electrolysed using the apparatus shown.




(i) Chlorine gas was collected in one of the test tubes.

Describe a test to show the gas is chlorine.

**(2)**

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(ii) Gas X was collected in the other test tube.
When gas X was mixed with air and ignited, it burned with a squeaky pop.

Give the name of gas X.

**(1)**

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(e) In industry, large amounts of chlorine are produced.

Explain why it could be dangerous to produce large amounts of chlorine in a factory.

**(2)**

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.....

**(Total for Question 3 = 10 marks)**

**Fuels**

**4** Different car engines are designed to use different fuels.
These fuels include diesel, ethanol, hydrogen, LPG (liquefied petroleum gas) and petrol.

(a) LPG contains the compound propane.

(i) Complete the structure of a molecule of propane, $C_3H_8$, showing all bonds.

**(1)**

**C——C——C**

(ii) Propane burns completely to produce carbon dioxide and water.

Describe how you would use limewater to show that carbon dioxide is produced.

**(2)**

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(iii) Incomplete combustion occurs when propane burns with insufficient oxygen available for complete combustion.

Explain a problem caused by the products of this incomplete combustion.

**(2)**

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(b) Biofuels can be used as alternatives to non-renewable, fossil fuels.

(i) Which of the following can be produced as a biofuel?

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

**(1)**

☒ **A** ethanol

☒ **B** hydrogen

☒ **C** LPG

☒ **D** petrol

(ii) Explain how a biofuel is different from a fossil fuel.

**(2)**

.....

.....

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.....

(c) The table shows information about two fuels, A and B, used in car engines.

| fuel | physical state | cost of 1 kg / £ | energy produced by complete combustion of 1 kg / MJ | availability at fuel station |
|---|---|---|---|---|
| A | gas | 2.13 | 142 | limited |
| B | liquid | 1.95 | 47 | good |

Explain which fuel, A or B, would be best for powering a car.

**(2)**

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.....

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.....

**(Total for Question 4 = 10 marks)**

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**Calcium carbonate**

**5** (a) Limestone is a rock which often contains fossils.



What type of rock is limestone?

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

**(1)**

- ☒ **A** igneous
- ☒ **B** lava
- ☒ **C** metamorphic
- ☒ **D** sedimentary

(b) Limestone is an important raw material.

Which of these is made using limestone as a raw material?

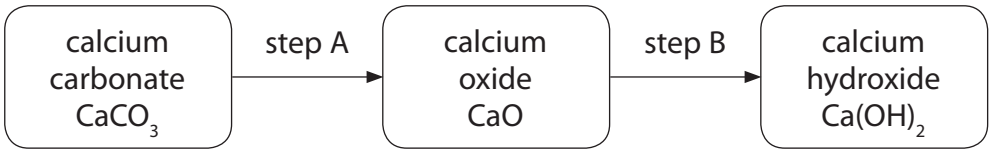
Put a cross (☒) in the box next to your answer.

**(1)**

- ☒ **A** bleach solution
- ☒ **B** cement
- ☒ **C** fertilisers
- ☒ **D** soap

(c) Limestone contains calcium carbonate.

Calcium carbonate can be converted into calcium oxide.
Calcium oxide can then be converted into calcium hydroxide.




(i) A lump of calcium carbonate is heated to convert it into calcium oxide in step A.

Explain why the mass of calcium oxide formed is less than the original mass of calcium carbonate.

**(2)**

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(ii) Write the word equation for the reaction in step B.

**(2)**

.....

*(d) Even though limestone is an important raw material in the chemical industry, many people are against plans to open new limestone quarries.

Discuss the advantages and disadvantages, to the local community and its surroundings, of opening a new limestone quarry.

**(6)**

**(Total for Question 5 = 12 marks)**

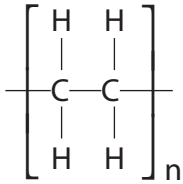
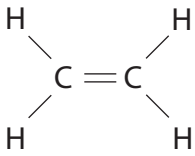
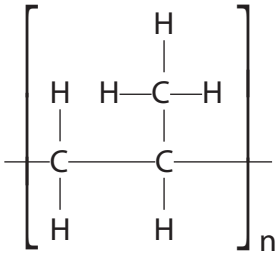
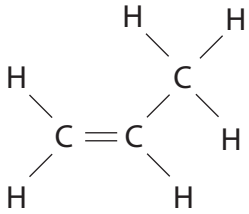
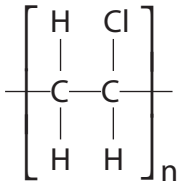
**Polymers**

**6** Polymer molecules are made by joining large numbers of small molecules (monomers) together.

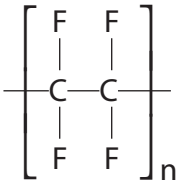
(a) The table shows some information about three polymers and the monomers used to make them.

Complete the table.

**(3)**

| name of polymer | structure of polymer molecule | name of the monomer used to make the polymer molecule | structure of monomer molecule |
|---|---|---|---|
| poly(ethene) |  | ..... |  |
| ..... |  | propene |  |
| poly(chloroethene) |  | chloroethene | ..... |

(b) The structure of the polymer poly(tetrafluoroethene), PTFE, is




State why this polymer is **not** a hydrocarbon.

**(1)**

.....

.....

(c) Poly(chloroethene), PVC, is used to make gutters and drainpipes.



One property of poly(chloroethene) is that it is easy to shape.

Describe other properties of poly(chloroethene) that make it suitable for gutters and drainpipes.

**(2)**

.....

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.....

.....

*(d) Waste is often disposed of by putting it in landfill sites, by burning or by recycling.

Discuss the advantages and disadvantages of each disposal method, and explain which disposal method should be used for plastic bottles.

**(6)**

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

**TOTAL FOR PAPER = 60 MARKS**