

Write your name here

Surname

Other names

Pearson
Edexcel GCSE

Centre Number

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Candidate Number

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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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PEARSON

The Periodic Table of the Elements

1		2		3		4		5		6		7		0							
														1 H hydrogen 1		4 He helium 2					
														relative atomic mass atomic symbol name atomic (proton) number							
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 Ni nickel 28	59 Co cobalt 27	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	106 Pd palladium 46	103 Rh rhodium 45	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	195 Pt platinum 78	192 Ir iridium 77	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	[271] Ds darmstadtium 110	[268] Mt meitnerium 109	[272] Rg roentgenium 111	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.

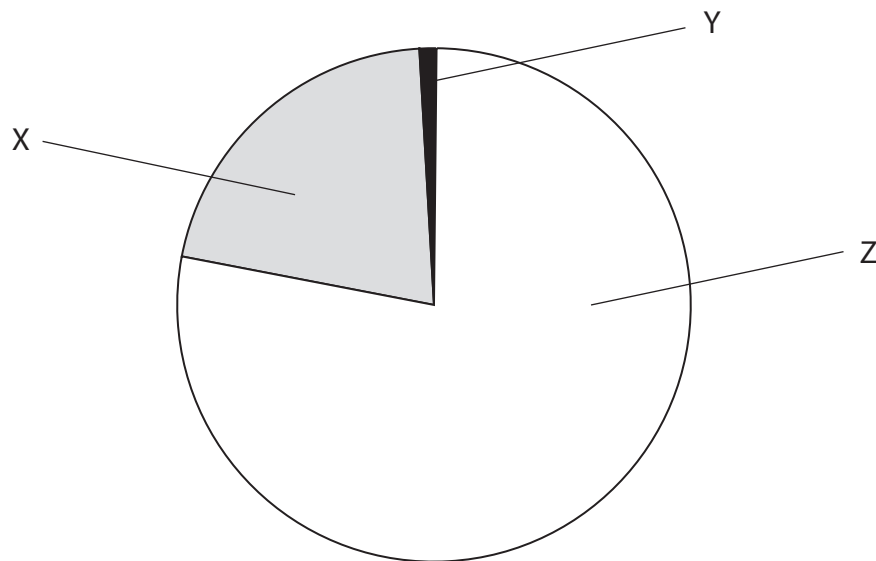


Answer ALL questions

Some questions must be answered with a cross 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.

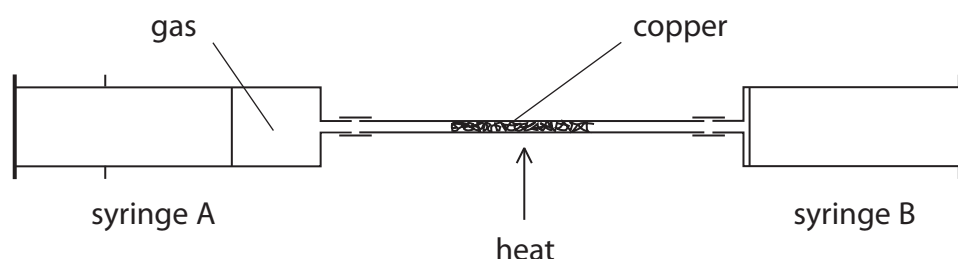
Describe the process that has caused this change.

(2)

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

(2)

- (c) This apparatus is used to find the volume of oxygen in 100 cm³ of air.



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

Syringe A contains 100 cm³ 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 cm³ of air.

(2)

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(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 (X) 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)

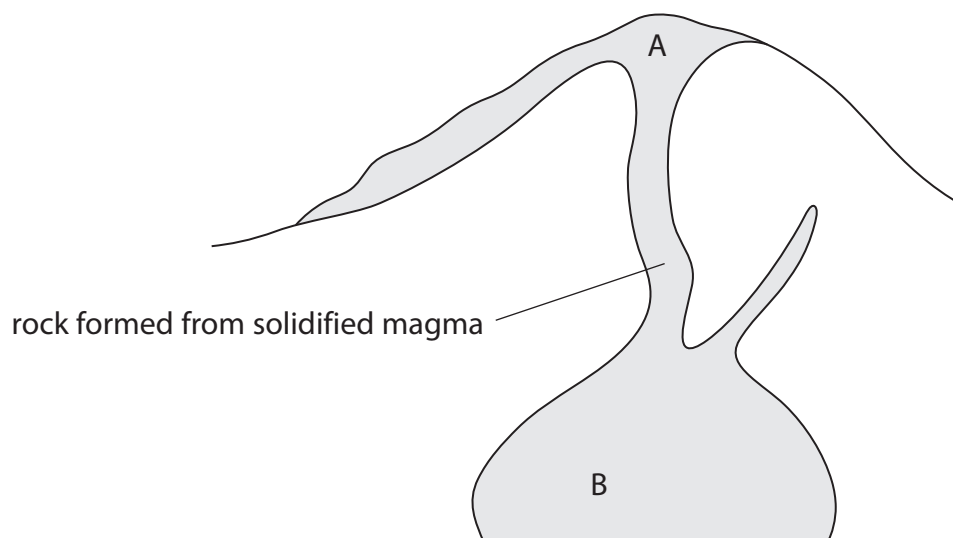
(iii) Marble is an example of a metamorphic rock.

Explain how marble is formed from limestone.

(2)



(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)

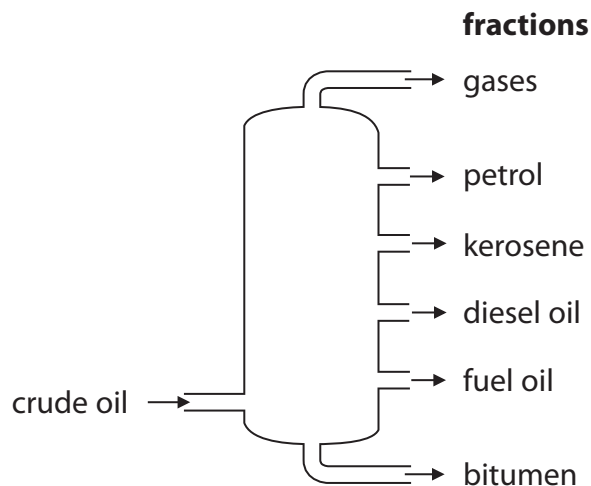


Fuels

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)

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- (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)

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

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

(3)

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- (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)

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(Total for Question 3 = 10 marks)

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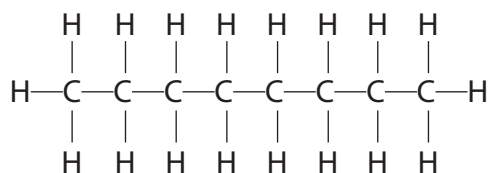


Fuels

- 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)

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- (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

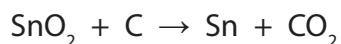
- (ii) Write the balanced equation for the reaction between zinc oxide and dilute hydrochloric acid.

(3)



Metals

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



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)

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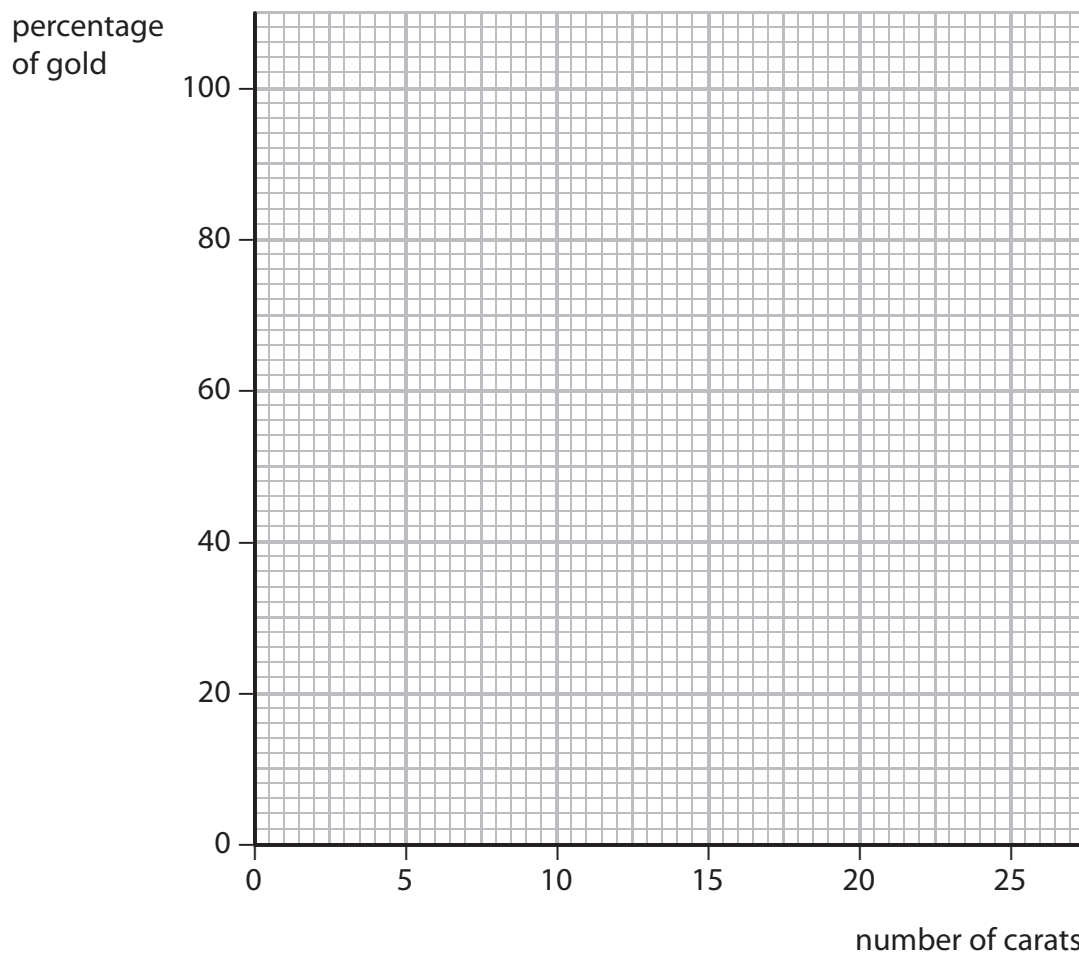
(ii) The purity of gold is often measured in carats.

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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