

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Friday 13 June 2025

Morning (Time: 1 hour 10 minutes) **Paper reference** **1SC0/2CF**

Combined Science

PAPER 5

Foundation Tier

You must have:
Calculator, ruler, Periodic Table (enclosed)

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.*
- Calculators may be used.
- Any diagrams may NOT be accurately drawn, unless otherwise indicated.
- You must **show all your working out** with **your answer clearly identified** at the **end of your solution**.

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.*
- In questions marked with an **asterisk** (*), marks will be awarded for your ability to structure your answer logically, showing how the points that you make are related or follow on from each other where appropriate.

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.

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Answer ALL questions. Write your answers in the spaces provided.

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 ☒.

1 The elements in group 7 of the periodic table are called the halogens.

(a) Give the symbol of the element astatine.

Use the periodic table to help you.

(1)

(b) (i) What is the colour of chlorine gas at room temperature?

(1)

☐ **A** yellow-green

☐ **B** red-brown

☐ **C** purple

☐ **D** black

(ii) Damp blue litmus paper can be used to test for chlorine gas.

Use words from the box to complete the sentences.

(2)

blue

orange

red

white

yellow

When damp blue litmus paper is added to chlorine gas there are **two** colour changes.

The damp blue litmus paper changes from blue to

The colour of the litmus paper then changes to



(c) Figure 1 shows the atomic number and boiling point of some of the halogens.

halogen	atomic number	boiling point in °C
fluorine	9	-188
chlorine	17	-35
bromine	35	59
iodine	53	

Figure 1

(i) Describe the trend in the boiling points of the first three halogens in Figure 1.

(2)

(ii) Using the information in Figure 1, predict the boiling point of iodine.

Write your prediction on the answer line below.

(1)

boiling point of iodine = °C

(Total for Question 1 = 7 marks)



- 2 A student investigates the temperature change when 10 g of solid magnesium chloride is dissolved in 100 cm³ of water.

Figure 2 shows the apparatus the student uses.

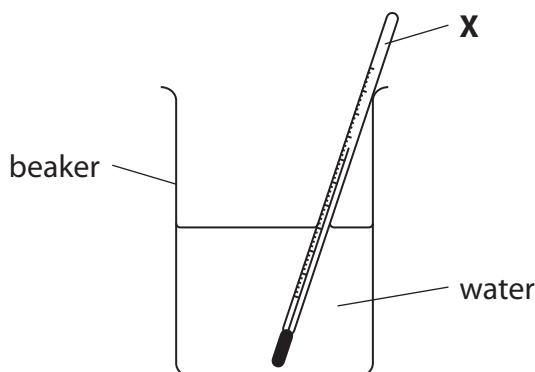


Figure 2

- (a) Name the piece of apparatus labelled **X** in Figure 2.

(1)

- (b) The student carries out the following steps

step 1 measure the initial temperature of the water in the beaker

step 2 add the magnesium chloride

step 3 stir the mixture

step 4 record the new temperature.

- (i) State why the mixture is stirred in step 3.

(1)

- (ii) State **two** ways the apparatus could be changed to reduce the heat energy lost during the investigation.

(2)

1

2



- (iii) The student carries out the experiment three times.

Figure 3 shows the results.

initial temperature of water in °C	temperature of mixture after stirring in °C	temperature change in °C
20.0	33.5	+13.5
20.0	32.8	+12.8
20.0	33.9	+13.9

Figure 3

Calculate the mean temperature change for this investigation.

(2)

mean temperature change = °C

- (iv) Explain, using the information in Figure 3, the type of reaction that occurs when magnesium chloride dissolves in water.

(2)

(Total for Question 2 = 8 marks)



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3 (a) Which gas made up the greatest proportion of the Earth's **early** atmosphere?

(1)

- ☐ A oxygen
- ☐ B nitrogen
- ☐ C carbon dioxide
- ☐ D argon

(b) Figure 4 shows the composition by volume of the Earth's atmosphere **today**.

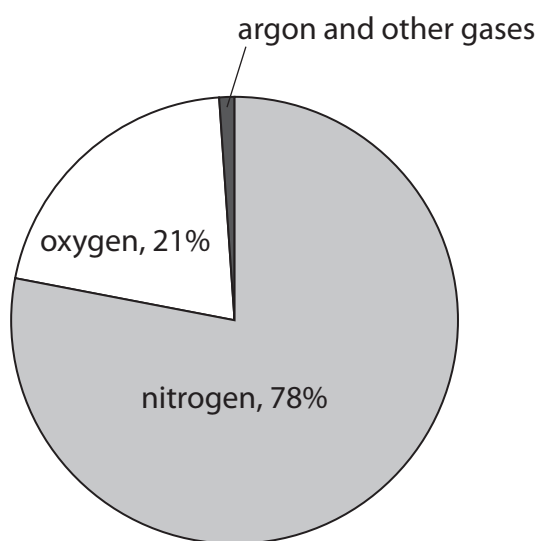


Figure 4

(i) Give the name of the gas in Earth's atmosphere today that makes up the largest proportion.

(1)

.....

(ii) Using the information in Figure 4, calculate the percentage of argon and other gases in the Earth's atmosphere today.

(1)

.....

percentage of argon and other gases =

- (c) The percentage of oxygen in air can be measured using the apparatus shown in Figure 5.

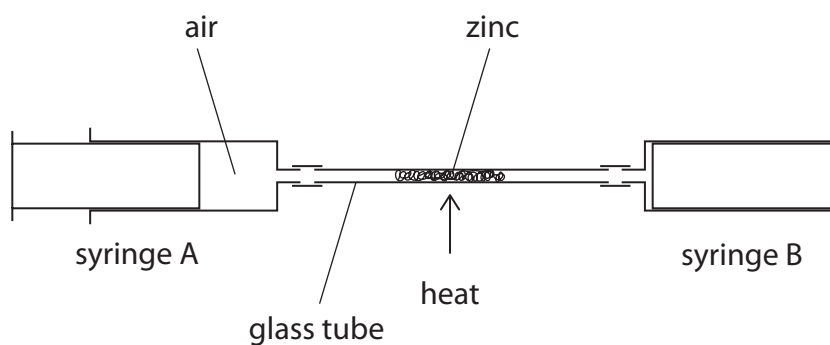


Figure 5

The oxygen in the air reacts with the heated zinc.

- (i) Explain **one** change that would be seen during the reaction.

(2)

- (ii) Name the product formed when the zinc reacts with oxygen in this experiment.

(1)



- (d) (i) Figure 6 shows the electron configuration of an argon atom.

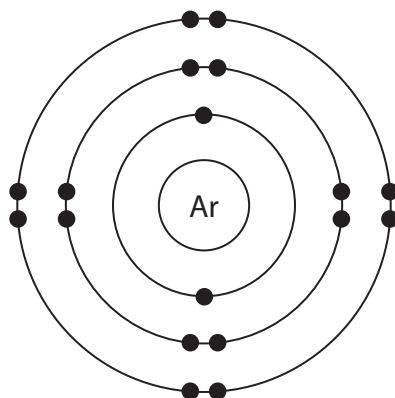


Figure 6

State why argon is unreactive.

(1)

- (ii) Argon makes up 0.93% of the Earth's atmosphere today.

$$\% \text{ gas} = \frac{\text{volume of a gas present in air}}{\text{total volume of air}} \times 100$$

Calculate the volume of argon, in cm^3 , in 4000 cm^3 of air.

(2)

volume of argon = cm^3

(Total for Question 3 = 9 marks)

4 Lithium is an alkali metal.

(a) (i) State which group of the periodic table contains the alkali metals.

(1)

(ii) Which of the following is a property of lithium?

(1)

- ☐ **A** hard
- ☐ **B** high density
- ☐ **C** high melting point
- ☐ **D** malleable

(b) A teacher adds a small piece of lithium to water containing universal indicator.

The universal indicator changes colour.

(i) State the colour change shown by the universal indicator.

(1)

from to

(ii) Place ticks (✓) in boxes next to **two** observations that are made when lithium reacts with water.

(2)

observations	(✓)
a green precipitate forms	
effervescence is seen	
the lithium sinks in the water	
the lithium gets smaller and disappears	
the temperature of the solution decreases	

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(iii) When lithium is added to water, lithium hydroxide and a gas are produced.

What is the name of the gas produced in this reaction?

(1)

- ☐ A carbon dioxide
- ☐ B chlorine
- ☐ C hydrogen
- ☐ D oxygen

(iv) Lithium hydroxide contains lithium ions, Li^+ .

Describe how a lithium atom becomes a lithium ion.

(2)

(v) Calculate the percentage by mass of hydrogen in lithium hydroxide, LiOH .

$$\% \text{ by mass of element} = \frac{\text{relative atomic mass of element}}{\text{relative formula mass of compound}} \times 100$$

(relative atomic masses: $\text{Li} = 7$, $\text{O} = 16$, $\text{H} = 1.0$)

(3)

percentage by mass of hydrogen =

(Total for Question 4 = 11 marks)

- 5 When solutions **P** and **Q** are mixed together, a purple mixture forms. This mixture slowly becomes colourless.

- (a) A student pours 25 cm^3 of solution **P** into a conical flask and then adds 25 cm^3 of solution **Q**.

The student uses a beaker to measure out these volumes.

Name a piece of apparatus that could be used to measure these volumes more accurately.

(1)

- (b) The student investigates this reaction using the apparatus shown in Figure 7. The student measures the time taken for the cross to become visible. The experiment is repeated at different temperatures.

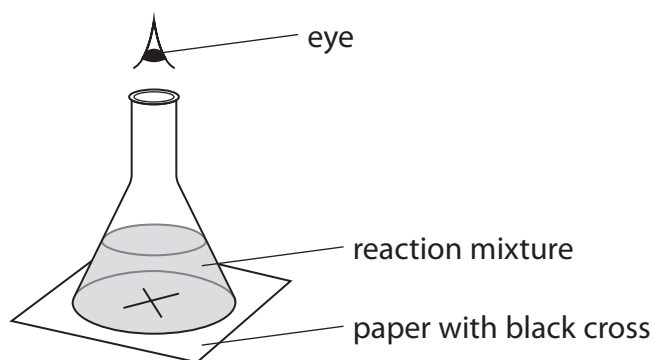


Figure 7

Figure 8 shows the results.

temperature in $^{\circ}\text{C}$	time in s
20	45
40	19
60	10

Figure 8



- (i) The concentrations of the solutions are kept constant in each experiment.

State **one** other variable that should be kept constant.

(1)

- (ii) State, and explain in terms of particles, how the time taken for the cross to become visible would change if a temperature of 80 °C was used.

(3)

- (c) The concentration of solution **Q** is 26.8 g dm⁻³.

Calculate the mass of solid **Q** present in 25 cm³ of solution **Q**.

$$\text{concentration (g dm}^{-3}\text{)} = \frac{\text{mass of solid (g)}}{\text{volume of solution (dm}^3\text{)}}$$

(2)

mass of solid **Q** = g

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(d) The student repeats the experiment at 20°C, with the addition of a catalyst.

Explain how the addition of a catalyst will affect the rate of reaction.

(2)

.....

.....

.....

.....

(e) Hydrogen peroxide, H_2O_2 , decomposes into oxygen and water.

A catalyst can be used to increase the rate of this reaction.

(i) Use a word or phrase from the box to complete the sentence about the mass of the catalyst in a reaction.

(1)

stays the same

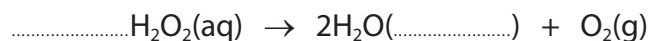
increases

decreases

During a reaction, the mass of a catalyst

(ii) Complete the balanced equation for this reaction and add the missing state symbol.

(2)



(Total for Question 5 = 12 marks)



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6 Crude oil is a mixture of hydrocarbons.

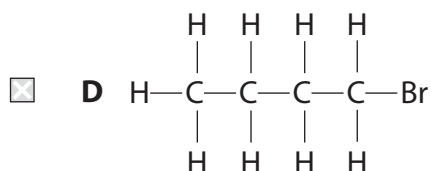
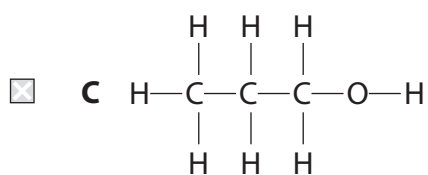
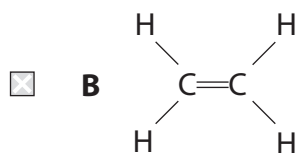
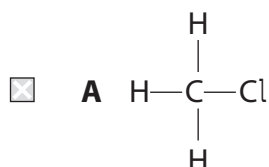
(a) (i) The majority of hydrocarbons in crude oil belong to one homologous series.

Give the name of this series.

(1)

(ii) Which structure represents a molecule of a hydrocarbon?

(1)



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- (b) When hydrocarbons undergo combustion, water is produced.

Draw a dot and cross diagram of a molecule of water.

(2)

- (c) One compound in crude oil contains 0.96 g of carbon atoms combined with 0.32 g of hydrogen atoms.

Calculate the empirical formula of this compound.

(relative atomic masses: C = 12, H = 1.0)

(3)

.....

.....

.....

.....

.....

.....

empirical formula of this compound =



- *(d) Crude oil is separated into useful products called fractions using fractional distillation.

Figure 9 shows a fractional distillation column and the fractions kerosene and fuel oil.

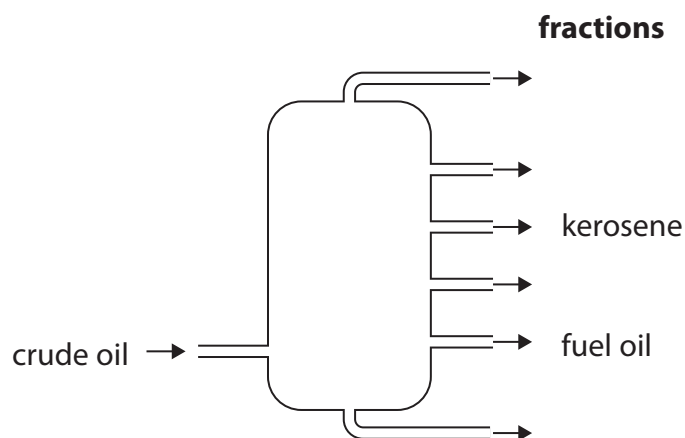


Figure 9

Kerosene and fuel oil have different uses depending on their properties.

Describe the properties and uses of kerosene and fuel oil.

Include in your answer

- the difference in boiling point
- the difference in viscosity
- the difference in ease of ignition
- their uses and how fuel oil can be converted into kerosene.

(6)

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(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS



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Paper
reference

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Periodic Table Insert

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The periodic table of the elements

1	2	Key										3	4	5	6	7	0
		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 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

1
H
hydrogen
1

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* The elements with atomic numbers from 58 to 71 are omitted from this part of the periodic table.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.