

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel International GCSE (9–1)

Friday 13 June 2025

Morning (Time: 1 hour 10 minutes) **Paper reference** **4SS0/1C**

Science (Single Award)
Chemistry
PAPER: 1C

You must have:
 Calculator

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **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.

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.*

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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The Periodic Table of the Elements

1	2	Key										3	4	5	6	7	0
1 H hydrogen 1												4 He helium 2					
		relative atomic mass atomic symbol 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
[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						

*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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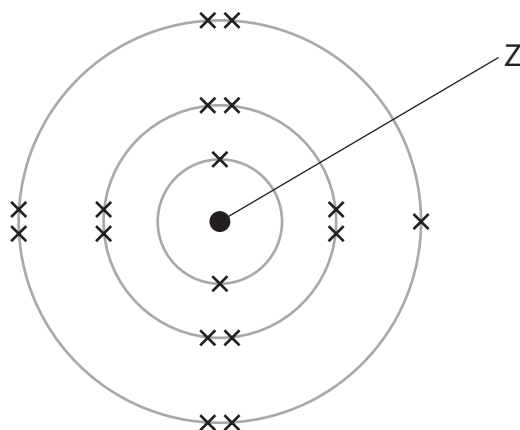
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Answer ALL questions.

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 ☐.

- 1** The diagram shows the arrangement of electrons in an atom of element Q.



- (a) Name the part of the atom labelled Z.

(1)

- (b) Which row shows the correct group and period for element Q?

Use the Periodic Table on page 2 to help you answer this question.

(1)

	Group	Period
☐ A	2	7
☐ B	3	7
☐ C	7	3
☐ D	7	2

(c) An atom of element Q has a mass number of 37

What is the number of neutrons in this atom?

(1)

- ☐ **A** 7
- ☐ **B** 17
- ☐ **C** 18
- ☐ **D** 20

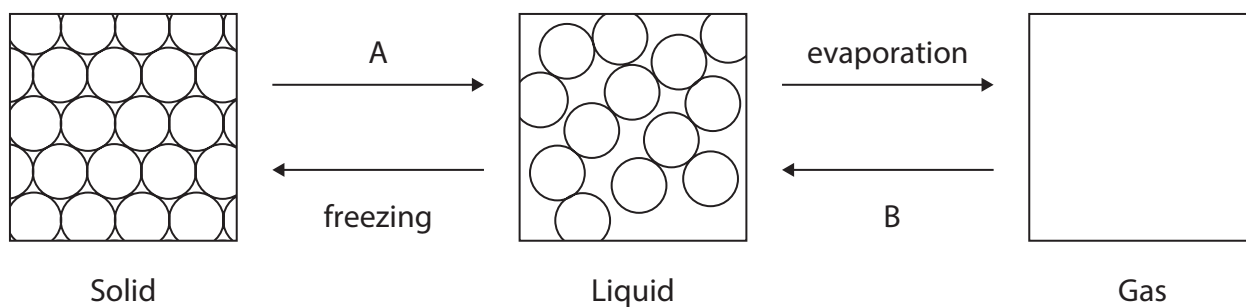
(d) Identify element Q.

Use the Periodic Table on page 2 to help you answer this question.

(1)

(Total for Question 1 = 4 marks)

- 2 The diagram shows how particles are arranged in a solid and a liquid, and some changes of state.



- (a) (i) Name the change of state labelled A.

(1)

- (ii) Name the change of state labelled B.

(1)

- (b) Describe the movement and arrangement of particles in a gas.

(2)

(Total for Question 2 = 4 marks)

3 This question is about elements in Group 1 of the Periodic Table.

(a) State the name given to all elements in Group 1 of the Periodic Table.

(1)

(b) A teacher adds a small piece of lithium to a trough of water.

(i) Which observation is **not** correct when lithium is added to water?

(1)

- ☐ A a colourless solution forms
- ☐ B a lilac flame is seen
- ☐ C effervescence occurs
- ☐ D lithium floats

(ii) After the reaction stops, the teacher adds a few drops of universal indicator to the solution in the trough.

Explain the final colour of the universal indicator.

(2)

(iii) Complete the equation for the reaction of lithium with water.

(2)



(Total for Question 3 = 6 marks)

4 This question is about mixtures.

(a) The table shows some methods used in the separation of mixtures.

Place **one** tick (✓) in each row to show the best method for each separation.

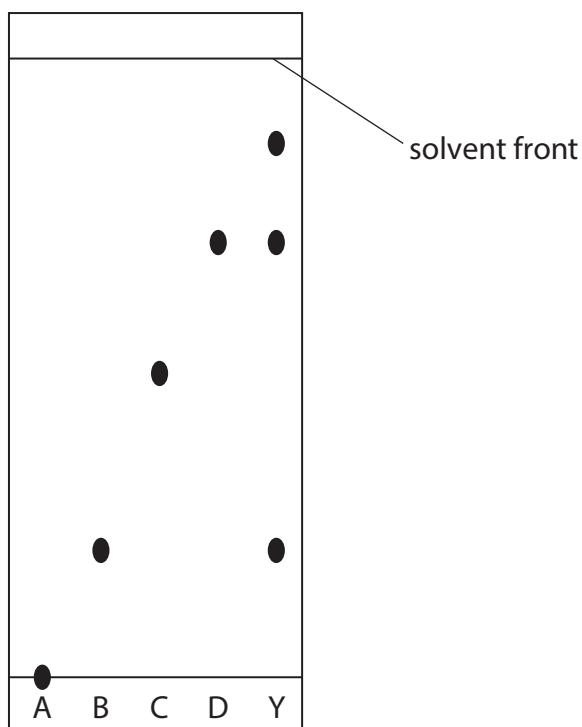
(2)

Separation	Method			
	crystallisation	filtration	fractional distillation	simple distillation
water from sodium chloride solution				
a liquid from a mixture of two liquids with different boiling points				

(b) A student does a chromatography experiment to find the composition of food colouring Y.

The student places four known dyes, A, B, C and D, and the food colouring Y on chromatography paper.

The diagram shows the chromatography paper at the end of the experiment.



(i) Describe what the results show about the composition of food colouring Y.

(2)

(ii) Calculate the R_f value of dye B.

(2)

R_f value =

(c) A student accidentally breaks a glass test tube containing crystals of sodium chloride.

Describe a method to obtain pure crystals of sodium chloride from the mixture of sodium chloride crystals and broken glass.

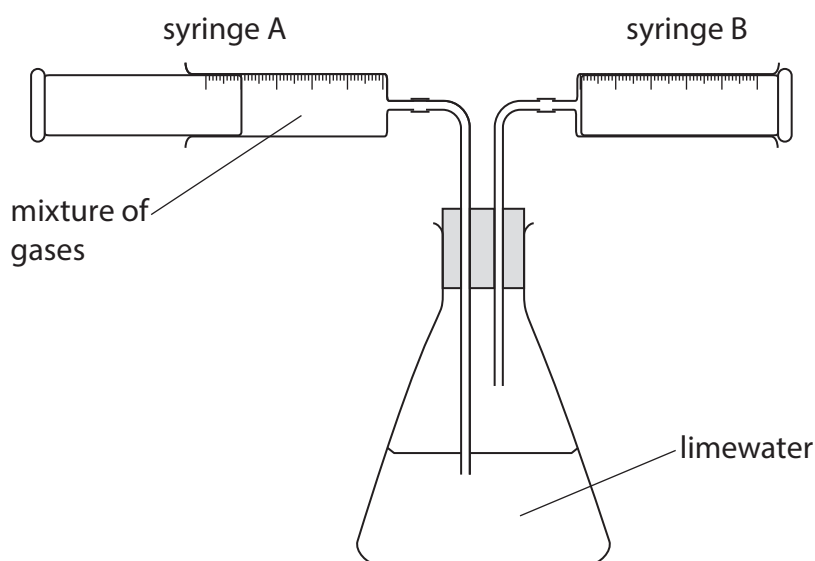
(3)

(Total for Question 4 = 9 marks)



- 5 A student does an experiment to determine the percentage by volume of carbon dioxide in a mixture of the gases carbon dioxide and helium.

The diagram shows the apparatus the student uses.



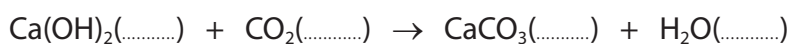
The student pushes the plunger on syringe A so the gas mixture bubbles through limewater.

- (a) Limewater is a solution of calcium hydroxide.

Limewater turns cloudy when carbon dioxide is bubbled through it.

Complete the equation for the reaction by adding the state symbols.

(2)



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(b) These are the student's results.

volume of gas in syringe A at the start = 80 cm^3

volume of gas in syringe B at the start = 0 cm^3

volume of gas in syringe B at the end = 45 cm^3

- (i) Using these results, calculate the percentage of carbon dioxide removed in the experiment.

Give your answer to 2 significant figures.

(3)

percentage of carbon dioxide removed =%

- (ii) Explain an improvement to the experiment to make sure that all the carbon dioxide has been removed from the mixture of gases.

(2)

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(Total for Question 5 = 7 marks)

6 This question is about hydrocarbons in crude oil.

(a) Candle wax contains alkanes.

These alkanes are obtained from the fuel oil fraction of crude oil.

Complete the formula for one of the alkanes in candle wax.

(1)



(b) State the differences between the fuel oil and gasoline fractions, in terms of colour, boiling point and viscosity.

(3)

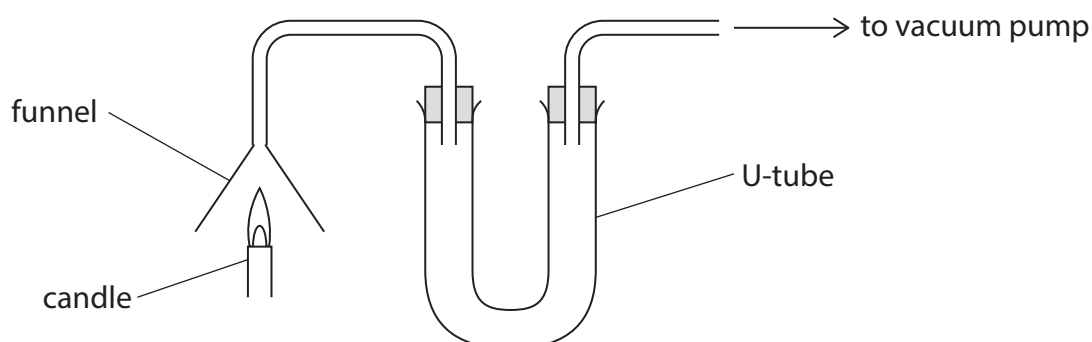
colour

boiling point

viscosity

(c) When a candle burns, one of the products is water vapour.

A teacher uses this apparatus to collect the water.



As the candle burns, liquid water collects in the U-tube and a black solid forms inside the funnel.

(i) Explain a modification to the apparatus to allow more water to collect in the U-tube.

(2)

(ii) Explain the formation of the black solid inside the funnel.

(2)

(iii) Describe a chemical test to show that the liquid in the U-tube contains water.

(2)

(Total for Question 6 = 10 marks)

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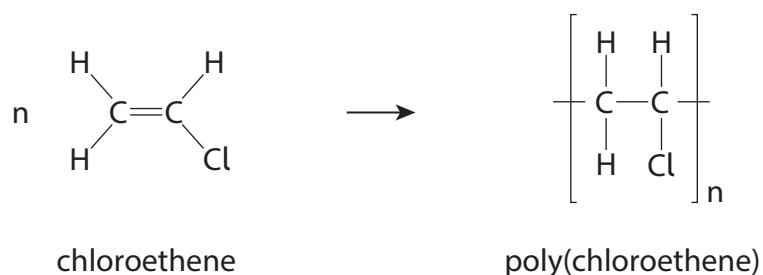
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7 This question is about alkenes.

- (a) This is the equation for the polymerisation of chloroethene to form poly(chloroethene).



The number of chloroethene molecules used to form one molecule of poly(chloroethene) is represented by n .

- (i) Give two problems with the disposal of polymers.

(2)

1

2

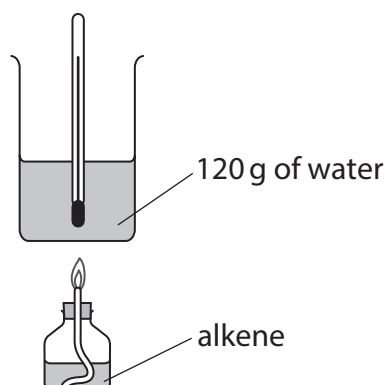
- (ii) A molecule of poly(chloroethene) has an M_r of 295 750

Show that the value of n is approximately 4700

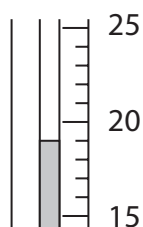
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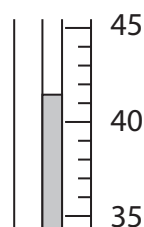
- (b) A scientist uses this apparatus to find the heat energy change when a liquid alkene is burned.



The diagram shows the reading on the thermometer before and after the experiment.



Before



After

- (i) Calculate the heat energy change in J.

[for water, $c = 4.2 \text{ J/g/}^\circ\text{C}$]

(4)

heat energy change = J

- (ii) Give one reason why the calculated value for the heat energy change using this apparatus is not accurate.

(1)

(Total for Question 7 = 10 marks)

8 This question is about compounds with ionic bonds, and compounds with covalent bonds.

- (a) Table 1 shows the charges on some ions and the formulae of some ionic compounds.

Complete the table by giving the missing formulae.

(3)

	Na^+	Mg^{2+}	Al^{3+}
Cl^-		MgCl_2	AlCl_3
SO_4^{2-}	Na_2SO_4	MgSO_4	
N^{3-}	Na_3N		AlN

Table 1

- (b) Sodium chloride and magnesium chloride form colourless solutions when dissolved in water.

Describe a test to show that a colourless solution contains sodium ions.

(2)

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.....

(c) Table 2 gives some information about silicon chloride and sodium chloride.

	Melting point in °C	Bonding	Structure
Silicon chloride	-70	covalent	simple molecular
Sodium chloride	800	ionic	giant lattice

Table 2

Explain the difference between the melting points of silicon chloride and sodium chloride.

Refer to bonding and structure in your answer.

(5)

(Total for Question 8 = 10 marks)

TOTAL FOR PAPER = 60 MARKS



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