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 12 June 2026

Morning (Time: 1 hour 15 minutes)

Paper reference **4CH1/2C**

Chemistry

UNIT: 4CH1
PAPER: 2C

You must have:
Calculator, ruler

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.*
- Show all the steps in the calculations and state the units.

Information

- The total mark for this paper is 70.
- 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 ▶

P79528A

P:1/1/1/1/

P 7 9 5 2 8 A 0 1 2 0

Pearson

The Periodic Table of the Elements

1	2											3	4	5	6	7	0
																	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 Lanthanides (atomic numbers 58-71) and the Actinides(atomic numbers 90-103) have been omitted.***

Cu and Cl have not been rounded to the nearest whole number.

BLANK 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 ☒.

1 This question is about polymerisation.

(a) The box gives some names used in polymerisation.

addition	alkane	alkene	condensation
dicarboxylic acid	poly(chloroethene)	water	

Complete the table by choosing the correct name from the box that matches each description.

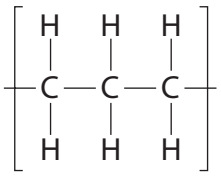
(4)

Description	Name
a monomer used to make an addition polymer	
a monomer used to make a condensation polymer	
a type of polymer that biodegrades	
a product of condensation polymerisation	

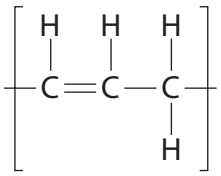
(b) Which structure shows the correct repeating unit for poly(propene)?

(1)

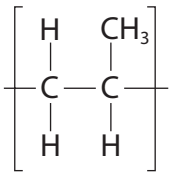
☒ **A**



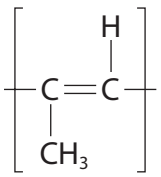
☒ **B**



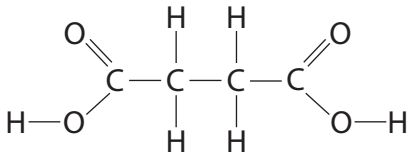
☒ **C**



☒ **D**



(c) This is the displayed formula for butane-1,4-dioic acid.



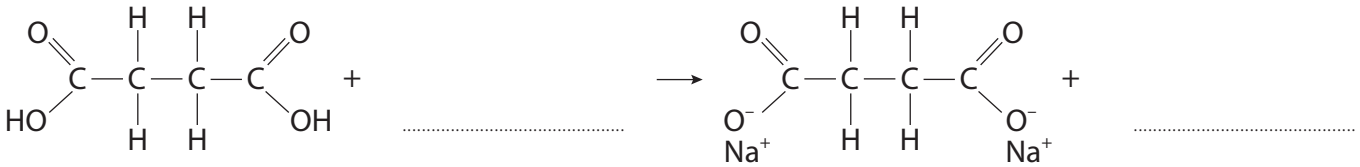
(i) Determine the molecular formula for butane-1,4-dioic acid.

(1)

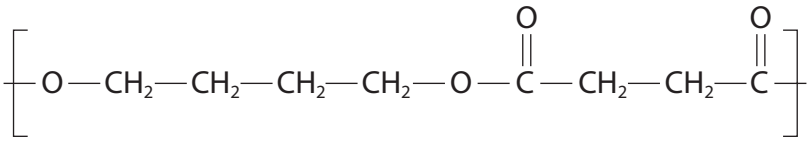
.....

(ii) Complete the chemical equation for the reaction between butane-1,4-dioic acid and sodium.

(2)



(iii) Butane-1,4-dioic acid can react to form this polyester.



Draw a circle around the part of the polyester that comes from a butane-1,4-dioic acid molecule.

(2)

(Total for Question 1 = 10 marks)

BLANK PAGE

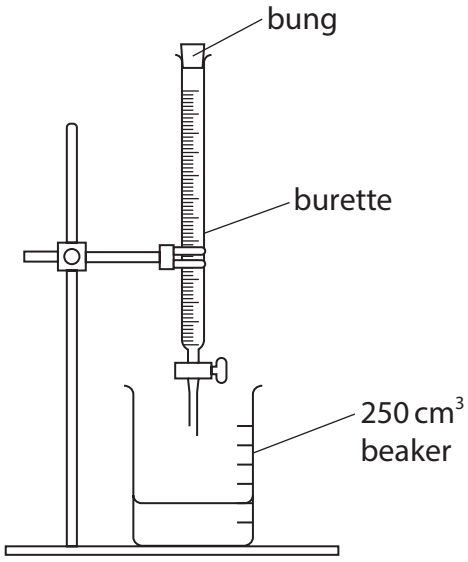
2 A titration can be used to prepare soluble salts.

(a) Name a negative ion that always gives a salt that is soluble in water.

(1)

.....

(b) A student sets up this apparatus to do a titration.



The student makes two mistakes when setting up their apparatus.

Suggest two changes to the student's set up that need to be made if the titration is to be done correctly.

(2)

1 .....

.....

2 .....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) The student plans this method for their titration.

- add 25.0 cm^3 of an alkali to the beaker
- add an acid to the burette until the level reaches 0.00 cm^3
- open the burette tap and add acid to the beaker until there is a colour change
- record the final reading on the burette
- repeat the method until concordant results have been obtained.

Give three improvements to the student's method.

Do not refer to changes in apparatus in your answer.

(3)

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

(d) Another student does a titration using the correct method.

The table shows their results.

Titration number	1	2	3	4
Volume of acid added in cm^3	22.95	22.65	23.05	22.90
Concordant results				

(i) Concordant results are those within 0.20 cm^3 of each other.

Add ticks (✓) to the table to show the concordant results.

(1)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(ii) Use the concordant results to calculate the mean volume of acid added.

(2)

mean volume = ... cm^3

(e) Sodium hydroxide solution is used in titrations.

(i) Explain whether sodium hydroxide solution is an acid, an alkali or a salt.

(2)

.....

.....

.....

.....

(ii) Solid sodium hydroxide is dissolved in excess water to make a solution.

This process is exothermic, with 47 kJ of energy released per mole.

Calculate the energy released, in kJ, when 0.55 kg of solid sodium hydroxide is dissolved in excess water.

[for sodium hydroxide $M_r = 40$]

(3)

energy released = ... kJ

(Total for Question 2 = 14 marks)

3 This question is about electrolysis.

(a) Compounds that only contain covalent bonds cannot be electrolysed.

(i) Describe what is meant by the term **covalent bond**.

(2)

(ii) State why covalent compounds do not conduct electricity.

(1)

(b) Lead(II) bromide is an ionic compound that can be electrolysed.

(i) During electrolysis, the lead(II) bromide is at a temperature of 400 °C.

Explain a suitable material for the electrodes.

(2)

(ii) The lead(II) ions in this electrolysis have a positive charge.

Give the term used to refer to all positive ions.

(1)

(iii) Give the half-equation for the reaction at the positive electrode.

(1)

(iv) Identify the particles that flow through the wires connecting the electrodes.

(1)

(c) Sodium chloride can also be electrolysed.

(i) The table gives the products at the positive electrode for the electrolysis of sodium chloride under different conditions.

Complete the table by giving the missing information.

(2)

Condition	Product at negative electrode	Product at positive electrode
molten sodium chloride		chlorine
aqueous sodium chloride		chlorine

(ii) Explain how chlorine gas forms at the positive electrode.

(3)

.....

.....

.....

.....

.....

.....

(iii) Molten sodium chloride is electrolysed to give 5000 mol of chlorine gas.

Calculate the maximum volume, in dm^3, of chlorine gas produced at rtp.

[molar volume of chlorine at rtp = 24 000 cm^3]

(2)

maximum volume = ... dm^3

(Total for Question 3 = 15 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

4 Potassium chloride is a soluble salt with the formula KCl

(a) A flame test is done on a sample of potassium chloride.

State the colour of the flame.

(1)

.....

(b) (i) Give a reason why adding blue litmus paper to a solution of potassium chloride is not a suitable test for chloride ions.

(1)

.....

.....

(ii) Give a suitable test for chloride ions.

(2)

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) A student is given a sample of solid potassium chloride.

Describe a method that the student could use to make 250 cm^3 of 0.500 mol/dm^3 potassium chloride solution.

Include suitable calculations and apparatus in your answer.

[for potassium chloride $M_r = 74.5$]

(6)

(Total for Question 4 = 10 marks)

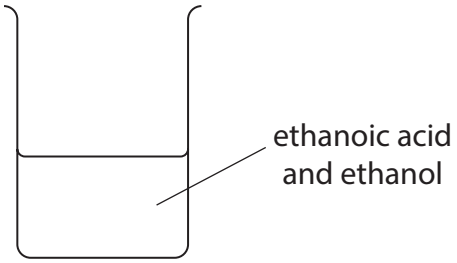
5 Ethanoic acid reacts with ethanol to produce ethyl ethanoate and water. This reaction is reversible.

(a) Complete the equation for the reaction between ethanoic acid and ethanol by adding the displayed formula of the missing reactant and the missing product.

(2)

CH_3COOH + ⟨ ⟩ ⇌ ⟨ ⟩ + H_2O

(b) Ethanoic acid and ethanol are mixed in a beaker.



Give a reason why this reaction is unlikely to reach equilibrium.

(1)

.....

.....

(c) The reaction between ethanoic acid and ethanol can be catalysed by sulfuric acid.

(i) Explain how a catalyst works.

(2)

.....

.....

.....

.....

(ii) Describe the effect of adding a catalyst on the yield of ethyl ethanoate at equilibrium.

Give a reason for your answer.

(2)

(d) The reaction between ethanoic acid and ethanol is exothermic.

Explain the effect that increasing the temperature would have on

- yield of ethyl ethanoate at equilibrium
- rate at which equilibrium is reached.

(5)

(Total for Question 5 = 12 marks)

6 This question is about the solubility of potassium sulfate in water.

(a) Give the formula for potassium sulfate.

(1)

.....

This method can be used to determine the solubility of potassium sulfate at different temperatures.

- add a known mass of potassium sulfate to 25 cm^3 of water in a boiling tube
- warm the boiling tube until all the potassium sulfate has dissolved
- cool the solution until crystals first appear, and record the temperature of the solution

Repeat the method with different masses of potassium sulfate.

(b) Give a suitable piece of equipment to measure the temperature of the solution.

(1)

.....

(c) State the independent variable in this method.

(1)

.....

(d) State why this method is not suitable for determining the solubility of barium sulfate.

(1)

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(e) The table shows the maximum mass of potassium sulfate that dissolves in 100 cm^3 of water at different temperatures.

Maximum mass of potassium sulfate in g	10.0	12.5	15.0	17.5	20.0
Temperature of water in °C	12.7	27.4	41.6	55.6	69.5

(i) Use data from the table to determine the mass of potassium sulfate dissolved in the boiling tube at 27.4 °C.

(2)

mass = ... g

(ii) A 200 cm^3 saturated solution of potassium sulfate is cooled from 55.6 °C to 27.4 °C.

Determine the mass, in g, of solid potassium sulfate that would crystallise.

(3)

mass = ... g

(Total for Question 6 = 9 marks)

TOTAL FOR PAPER = 70 MARKS

BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

BLANK PAGE