

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)

Monday 19 May 2025

Morning (Time: 1 hour 10 minutes) **Paper reference 4WSD3/1CR**

Science (Double Award) (Modular)

Chemistry

UNIT 3: 4WSD3

PAPER: 1CR

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 where required.

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.

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Answer ALL questions.

- 1** (a) The diagram shows an incomplete Periodic Table.
Use information from the diagram to answer all parts of this question.

	Be														O		
												Al					
K																	
										Ag						Xe	

- (i) Give the symbol of a Group 1 metal.

(1)

- (ii) Give the symbol of a noble gas.

(1)

- (iii) Give the symbols of two elements in the same period.

(1)

- (b) (i) Give the number of electrons in the outer shell of an atom of aluminium.

(1)

- (ii) Draw a diagram to show the electron configuration of aluminium.

(2)

(c) A sample of sulfur contains 94% of the isotope ^{32}S and 6% of the isotope ^{34}S

Calculate the relative atomic mass of the sample.

(2)

relative atomic mass =

(Total for Question 1 = 8 marks)



2 This question is about the three states of matter, solid, liquid and gas.

- (a) Solids, liquids and gases can be changed from one state to another.
The box gives the names of some changes of state.

condensing	evaporation	freezing
melting	sublimation	

Use words from the box to answer the questions.

- (i) Give the name of the change from liquid to solid.

(1)

- (ii) Give the name of the change from liquid to gas.

(1)

- (iii) Give the name of the change from solid to gas.

(1)

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

(3)

(Total for Question 2 = 6 marks)

3 This question is about acids and metal carbonates.

(a) Give the formula of the ion found in all aqueous solutions of acids.

(1)

(b) Potassium carbonate is a weak base.

Suggest the pH of potassium carbonate solution.

(1)

(c) Potassium carbonate reacts with hydrochloric acid.

Give the name of the salt formed.

(1)

(d) The formula of potassium carbonate is K_2CO_3

Calculate its relative molecular mass.

(3)

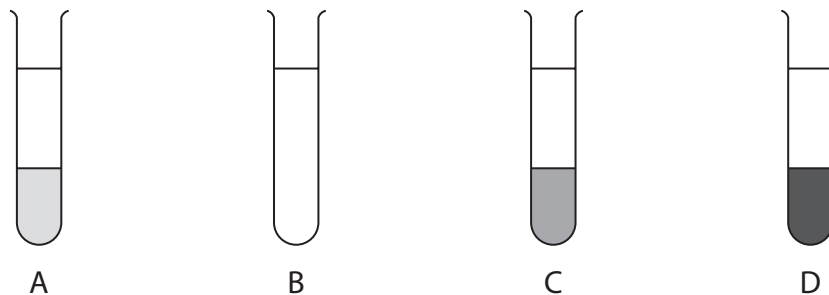
relative molecular mass =



(e) Four test tubes each contain 5 cm^3 of water.

A different metal carbonate is added to each test tube.

The diagram shows the results after the metal carbonates have been stirred in the water.



Explain which test tube, A, B, C or D, could contain potassium carbonate.

(2)

(Total for Question 3 = 8 marks)



4 This question is about mixtures.

- (a) The table shows experimental values for the boiling point temperature ranges of four different substances.

Substance	Temperature in °C
P	78 to 79
Q	100 to 105
R	126 to 132
S	200 to 210

Explain which substance, P, Q, R or S, is most likely to be pure.

(2)

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.....

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(4)

(Total for Question 4 = 6 marks)



5 This question is about rusting.

(a) Give the names of two substances that react with iron to form rust.

(2)

1

2

(b) Iron can be coated with zinc to prevent rusting.

(i) Name this coating process.

(1)

.....

(ii) Explain how the zinc coating prevents the iron from rusting.

(2)

.....

.....

.....

.....

(c) Iron is in the lower part of the reactivity series.

Iron(II) sulfate solution reacts with magnesium metal.

(i) State this type of reaction.

(1)

.....

(ii) Give a chemical equation for the reaction between iron(II) sulfate solution and magnesium.

Include state symbols.

(2)

.....

(Total for Question 5 = 8 marks)

.....



6 This question is about products from crude oil.

- (a) Most of the compounds in crude oil are from the same homologous series.

Give the name of this homologous series.

(1)

- (b) Many fuels are obtained from the fractional distillation of crude oil.

Explain how the combustion of a common impurity in fuels causes acid rain.

(3)

- (c) The equation shows the cracking of a hydrocarbon produced from the fractional distillation of crude oil.



- (i) Give the temperature and the catalyst used in catalytic cracking.

(2)

temperature

catalyst

(ii) Explain why cracking is a useful process in the oil industry.

(3)

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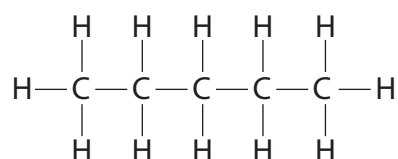


(d) The formula C_5H_{12} represents three isomers.

(i) Explain what is meant by the term **isomers**.

(2)

(ii) This is the displayed formula of one of the isomers.



Draw the displayed formula of each of the other two isomers.

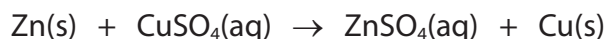
(2)

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(Total for Question 6 = 13 marks)

- 7 A student investigates the reaction between zinc and copper(II) sulfate solution.

This is the equation for the reaction.



This is the student's method.

Step 1 add 25.0 cm³ of copper(II) sulfate solution to a glass beaker

Step 2 record the temperature of the solution

Step 3 add between 5 g and 6 g of zinc powder (an excess) and stir the mixture

Step 4 record the highest temperature reached

- (a) (i) Explain an improvement to step 1 to produce a more accurate temperature rise.

(2)

- (ii) Give a reason why the student does not need to know the exact mass of zinc added in step 3.

(1)

- (iii) State the colour change in the solution.

(1)

from to



- (b) (i) The table shows the student's results.

volume of copper(II) sulfate solution in cm^3	25.0
initial temperature of the copper(II) sulfate solution in $^{\circ}\text{C}$	18.5
final temperature of the copper(II) sulfate solution in $^{\circ}\text{C}$	48.6

Calculate the heat energy change (Q) in joules (J).

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

[mass of 1.0 cm^3 of solution = 1.0 g]

(3)

$Q = \dots\dots\dots \text{ J}$

- (ii) The student repeats the experiment and calculates Q as 3800 J .
The solution used contains 6.38 g of copper(II) sulfate.

Calculate the molar enthalpy change, ΔH , in kJ/mol .

Include a sign in your answer.

[for CuSO_4 , $M_r = 159.5$]

(4)

$\Delta H = \dots\dots\dots \text{ kJ}/\text{mol}$

(Total for Question 7 = 11 marks)

TOTAL FOR PAPER = 60 MARKS

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