



Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE
In Chemistry (4CH1) Paper 2C

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Notes	Marks
1 (a)	(i) water	ALLOW H ₂ O	1
	(ii) petrol		1
	(iii) fluorine	ALLOW F ₂	1
	(iv) calcium	ALLOW Ca	1
(b)	(i) fractional distillation	ALLOW fractionating / fractionation IGNORE distillation alone	1
	(II) aircraft fuel / jet fuel / (aero)plane fuel /aviation fuel	must mention fuels, not just aircraft etc. ALLOW fuel for lamps/for heaters/ for stoves	1
			Total 6

Question number	Answer	Notes	Marks
2 (a)	heat (energy) / thermal energy is given out /released / lost to the surroundings	not just energy, needs to be heat released or thermal energy released ALLOW gives out energy and raises temperature of surroundings	1
(b)	$\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$	subscript, superscript and case must be correct IGNORE state symbols	1
(c)	M1 smooth curve starting at the origin M2 levels off horizontally at constant volume	M2 depends on rising	2
(d)	An explanation that links the following 4 points M1 rate of reaction increases M2 particles /molecules have more (kinetic) energy /KE M3 more collisions per unit time M4 more successful collisions /more particles have the (necessary) activation energy/ E_a	ALLOW particles /molecules move faster ACCEPT more frequent collisions IGNORE rate of collision increases ALLOW more frequent successful collisions for M3 and M4	4
(e)	M1 label reactants and products M2 product line below reactant line and to the right of the line M3 showing activation hump M4 activation energy/ E_a labelled correctly	ACCEPT names of reactants and products ALLOW formulae of reactants and products even if incorrect as not given in the question ACCEPT with arrow pointing upwards REJECT arrow pointing downwards/double headed arrow /just a line	5

	M5 line showing ΔH from reactants to products	ACCEPT with arrow pointing downwards REJECT arrow pointing upwards/double headed arrow /just a line ecf M1, M3, M4, M5 for endothermic reaction	Total 13
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Question number	Answer	Notes	Marks
3 (a) (i)	M1 same number of protons M2 different number of neutrons	IGNORE same number of electrons REJECT the different number of electrons for M2	2
(ii)	M1 $\frac{76.5 \times 24 + 10.5 \times 25 + 13.0 \times 26}{100}$ M2 24.365 M3 24.4	correct answer without working scores 3 24 no working scores 0	3
(b)	B (calcium sulfate) A is incorrect as calcium nitrate is soluble C is incorrect as magnesium nitrate is soluble D is incorrect as magnesium sulfate is soluble		1
(c)	M1 diagram of magnesium ion with electron configuration 2,8 M2 diagram of oxide ion with electron configuration 2,8 M3 correct charges on the ions, e.g. Mg^{2+} and O^{2-}	ALLOW any combination of dots and crosses If the two inner circles of the electrons are missing M1 and M2 allow 1 mark M3 is an independent mark ALLOW Mg^{+2} and O^{-2}	3
(d)	An explanation that links the following five points M1 water is covalent /water is a molecule M2 water has not enough charged particles /not enough ions /no (delocalised) electrons AND so not free to move /cannot conduct electricity /cannot carry a current	ALLOW no charged particles/ no ions /no (delocalised) electrons IGNORE cannot carry a	5

		<p>M3 magnesium chloride is an ionic (compound/substance/solid/lattice)</p> <p>M4 ions in solid magnesium chloride do not move / ions in fixed positions (do not move)</p> <p>M5 ions in aqueous / solution magnesium chloride are free to move</p>	<p>charge</p> <p>No M5 if any mention of electrons moving or delocalised electrons</p> <p>lose 1 mark if there is any mention of intermolecular forces in magnesium chloride</p>	
(e)	(i)	$2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^{(-)}$		1
	(ii)	chloride (ions)/ Cl^- (ions) lose electron(s)	<p>ALLOW electron(s) are lost</p> <p>REJECT chlorine / Cl / Cl_2 loses electrons</p>	1
				Total 16

Question number	Answer	Notes	Marks
4 (a)	(i) sulfuric acid / phosphoric acid	ACCEPT dilute or concentrated ALLOW H ₂ SO ₄ / H ₃ PO ₄	1
	(ii) M1 (from) orange M2 (to) green	must be in the correct order	2
(b)	(i) 2CH ₃ COOH + Na ₂ CO ₃ → 2CH ₃ COONa + CO ₂ + H ₂ O M1 2CH ₃ COONa M2 CO ₂ + H ₂ O	ALLOW 2NaCH ₃ COO / 2NaOOCCH ₃	2
	(ii) Any two from:- M1 bubbles/ fizzing/effervescence M2 sodium carbonate/solid disappears /gets smaller M3 loss of vinegar smell	IGNORE gas produced even if incorrect ALLOW dissolves	2
(c)	(i) catalyst / to speed up the reaction		1
	(ii) ethanol is (in)flammable /can ignite	ACCEPT ethyl ethanoate is (in)flammable /can ignite ALLOW mixture or it is (in)flammable /can ignite	1
	(iii) distinctive/fruity/sweet smell	ACCEPT oily liquid IGNORE nice smell	1
	(iv) M1 correct ester functional group M2 rest of molecule correct $ \begin{array}{ccccccc} & \text{H} & \text{O} & & \text{H} & \text{H} & \\ & & & & & & \\ \text{H} & -\text{C} & -\text{C} & -\text{O} & -\text{C} & -\text{C} & -\text{H} \\ & & & & & & \\ & \text{H} & & & \text{H} & \text{H} & \end{array} $	M2 dep on M1	2
			Total 12

Question number	Answer	Notes	Marks								
5 (a)	(i) pipette		1								
	(ii) can see colour change (more) clearly OWTTE		1								
(b)	M1 32.25 M2 28.10	each value must be given to 2 decimal places ALLOW ecf for M2 if M1 is incorrect	2								
(c)	(i)	<table border="1"> <tbody> <tr> <td>27.40</td> <td>27.65</td> <td>27.30</td> <td>27.35</td> </tr> <tr> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> </tr> </tbody> </table>	27.40	27.65	27.30	27.35	✓		✓	✓	1
	27.40	27.65	27.30	27.35							
✓		✓	✓								
(ii)	(mean =) 27.35 (cm ³)	ALLOW ecf if different ticks are involved No ecf if no ticks or only one tick is present REJECT 3 decimal places	1								
(d)	(i) M1 ($n \text{ KOH} =$) $0.025 \times 0.5(00)$ OR 0.0125 (mol) M2 ($n \text{ H}_2\text{SO}_4 =$) $0.0125 \div 2$ OR 0.00625 (mol) M3 (conc = $0.00625 \div 0.0265 =$) 0.236 (mol/dm ³) ALTERNATIVE METHOD $C_1 \times V_1 = C_2 \times V_2$ $0.5 \times 25.0 / 26.5 = C_2$ $C_2 = 0.472$ Divide by 2 = 0.236 So 1000 can be ignored	correct answer scores 3 marks ALLOW 0.472 / 0.118 for 2 marks ALLOW any number of sig figs except 1 REJECT incorrect rounding for 1 mark	3								

(ii)	<p>A description that refers to the following points</p> <p>M1 heat the solution of potassium sulfate until it is partly evaporated / crystals form / saturated solution</p> <p>M2 allow the solution to cool / to crystallise</p> <p>M3 filter (the solution) to obtain the crystals</p> <p>M4 leave the crystals to dry / dry the crystals with filter paper / dry in a (warm) oven / dry in a warm place</p>	<p>If heated to dryness max 1 mark</p> <p>If just left the solution to evaporate only M3 and M4 can be scored</p> <p>ALLOW decant the solution/liquid from the crystals</p> <p>IGNORE wash the crystals</p> <p>ALLOW place the crystals in a desiccator</p> <p>No M4 if heated directly with a Bunsen burner / hot oven</p>	<p>4</p> <p>Total 13</p>
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Question number	Answer	Notes	Marks
6 (a)	(i) A lighted /burning /flame splint pops	REJECT a glowing splint IGNORE squeaky pop test alone	1
	(ii) reversible (reaction)	ALLOW goes both ways /can go forwards and backwards at the same time IGNORE (dynamic) equilibrium	1
(b)	(i) An explanation that links the following two points M1 yield increases AND reaction shifts towards the right hand side M2 as the (forward) reaction is endothermic	ALLOW yield increases AND forward reaction M2 dep on yield increases or missing IGNORE references to Le Chatelier	2
	(ii) An explanation that links the following two points M1 no effect on the yield M2 as there are the same number of moles /molecules /2 moles /2 molecules on both sides (so no effect on the position of the equilibrium)	M2 dep on M1 or missing IGNORE references to Le Chatelier	2
(c)	M1 ($n_{I_2} =$) $\frac{50.8}{254}$ OR 0.2(0) (mol) M2 ($n_{HI} =$) $\frac{0.2(0) \times 2 \times 80}{100}$ OR 0.32 (mol) M3 (volume of HI) = $0.32 \times 24\,000$ OR 7 680 (cm ³) M4 7.68×10^3 / 7.7×10^3 (cm ³) ALTERNATIVE METHOD M1 254g gives 48000 cm ³ so M2 50.8g gives 9600 cm ³ so M3 9600 x 80/100 M4 7.68×10^3 cm ³	correct answer scores 4 ALLOW ecf throughout as long as attempt to calculate moles 3.84×10^3 / 9.6×10^3 / 1.92×10^3 scores 3 3840 / 9600 / 1920 scores 2 $1.5(36) \times 10^4$ scores 3 15360 scores 2	4
Total 10			

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