Mark Scheme (Results)

Summer 2025

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

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2025
Question Paper Log Number P78951A
Publications Code 4CH1_2C_2506_MS

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.

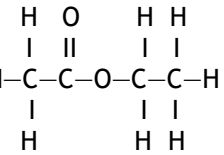
Question number	Answer	Notes	Marks
1 (a) (i)	water	**ALLOW** H_2O	1
(ii)	petrol		1
(iii)	fluorine	**ALLOW** F_2	1
(iv)	calcium	**ALLOW C**a	1
(b) (i)	fractional distillation	**ALLOW** fractionating / fractionation **IGNORE** distillation alone	1
(II)	aircraft fuel / jet fuel / (aero)plane fuel /aviation 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)	$Mg + 2HCl \rightarrow MgCl_2 + H_2$	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 Δ*H* 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**

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 i**s 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

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

Question number	Answer	Notes	Marks
4 (a) (i)	sulfuric acid / phosphoric acid	**ACCEPT** dilute or concentrated **ALLOW** H_2SO_4 /H_3PO_4	1
(ii)	**M1** (from) orange **M2** (to) green	must be in the correct order	2
(b) (i)	$2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + CO_2 + H_2O$ **M1** $2CH_3COONa$ **M2** $CO_2 + H_2O$	 **ALLOW** $2NaCH_3COO$ /$2NaOOCCH_3$	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  **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><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></table>		1
(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* KOH =) 0.025 x 0.5(00) **OR** 0.0125 (mol) **M2** (*n* H_2SO_4 =) 0.0125 ÷ 2 **OR** 0.00625 (mol) **M3** (conc = 0.00625 ÷ 0.0265 =) 0.236 (mol/dm^3) ALTERNATIVE METHOD C1 X V1 = C2 X V2 0.5 X 25.0 /26.5 = C2 C2 = 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)	A description that refers to the following points **M1** heat the solution of potassium sulfate until it is partly evaporated / crystals form /saturated solution **M2** allow the solution to cool / to crystallise **M3** filter (the solution) to obtain the crystals **M4** leave the crystals to dry / dry the crystals with filter paper /dry in a (warm) oven /dry in a warm place	If heated to dryness max 1 mark If just left the solution to evaporate only **M3** and **M4** can be scored **ALLOW** decant the solution/liquid from the crystals **IGNORE** wash the crystals **ALLOW** place the crystals in a desiccator No **M4** if heated directly with a Bunsen burner/ hot oven	4 **Total 13**

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** (nI_2 =) $\frac{50.8}{254}$ **OR** 0.2(0) (mol) **M2** (nHI =) $\frac{0.2(0) \times 2 \times 80}{100}$ **OR** 0.32 (mol) **M3** (volume of HI) = 0.32 × 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 x 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) x 10^4 scores 3 15360 scores 2	4
			Total 10

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom