



Mark Scheme (Results)

January 2026

Pearson Edexcel International Advanced Level in Chemistry
Paper 01A: Practical Skills in Chemistry II

WCH16/01A

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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.

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:

- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.

() means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.

Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.

ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Additional Guidance	Mark
1(a)(i)	An answer that makes reference to the following point $\text{Fe}^{3+} / [\text{Fe}(\text{H}_2\text{O})_6]^{3+}$	Allow $\text{Fe}(\text{H}_2\text{O})_6^{3+}$ Ignore iron(III) Ignore state symbols even if incorrect Ignore missing []	(1)

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	An answer that makes reference to the following point $\text{Fe}(\text{OH})_3 / \text{Fe}(\text{OH})_3(\text{H}_2\text{O})_3$	TE on incorrect cation from (a)(i) Allow ligands in either order Ignore iron(III) hydroxide Ignore state symbols even if incorrect	(1)

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	An answer that makes reference to the following point iodine / I_2 / I_3^-	Do not award I / I^- Do not award iodine as a compound with a metal eg MI_3 Ignore state symbols even if incorrect	(1)

Question Number	Answer	Additional Guidance	Mark
1(a)(iv)	An answer that makes reference to the following point silver nitrate (solution) / AgNO_3 ((aq))	Allow Ag^+((aq)) Ignore subsequent tests e.g. addition of ammonia	(1)

Question Number	Answer	Additional Guidance	Mark
1(a)(v)	An answer that makes reference to the following point effervescence / fizzing / bubbles	Allow pass through limewater and the limewater turns cloudy Ignore just gas/carbon dioxide is evolved Do not award reference to coloured gases/ incorrect gasses e.g. hydrogen/oxygen	(1)

Question Number	Answer	Additional Guidance	Mark						
1(b)(i)	An answer that makes reference to the following points: (precipitate colour) green (precipitate formula) $\text{Fe}(\text{OH})_2$ / $\text{Fe}(\text{OH})_2(\text{H}_2\text{O})_4$ (cation formula) Fe^{2+} / $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$	Mark all parts independently (1) Ignore shades Stand alone mark, award if green is identified regardless of cation seen in (a)(i) Allow TE from (a)(i) only for: <table><tr><td>cation identified in (a)(i) reduced to...</td><td>ppt colour</td></tr><tr><td>Cr^{2+}</td><td>pale blue / white-grey</td></tr><tr><td>Mn^{2+}</td><td>pale brown</td></tr></table> (1) Allow TE from (a)(i) for M2 and M3 for the reduced version of any ion identified (1) Ignore iron(II) hydroxide Ignore iron(II)	cation identified in (a)(i) reduced to...	ppt colour	Cr^{2+}	pale blue / white-grey	Mn^{2+}	pale brown	(3)
cation identified in (a)(i) reduced to...	ppt colour								
Cr^{2+}	pale blue / white-grey								
Mn^{2+}	pale brown								

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	An answer that makes reference to the following point Fe(OH)₃ / Fe(OH)₃(H₂O)₃	Allow Fe₂O₃ Allow ligands in either order Ignore iron(III) hydroxide <u>Only TE is for Mn:</u> Allow MnO / Mn(OH)₂ if a Mn²⁺ ion is identified in (a)(i) Allow Mn₂O₃ / Mn(OH)₃ if Mn³⁺ ion is identified in (a)(i) Allow MnO₂ / Mn(OH)₄ if Mn⁴⁺ ion is identified in (a)(i) Ignore state symbols even if incorrect	(1)

Question Number	Answer	Additional Guidance	Mark
1(c)	An answer that makes reference to the following point equation	<u>Example of equation</u> $2\text{Fe}^{3+} + \text{SO}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{Fe}^{2+} + \text{SO}_4^{2-} + 4\text{H}^+$ Accept use of hydrated ions Allow TE from (a)(i) provided equation is balanced Ignore state symbols even if incorrect	(1)

(Total for Question 1 = 10 marks)

Question Number	Answer	Additional Guidance	Mark
2(a)	An answer that makes reference to the following point: the solid needs to dissolve before it can quench	Allow the reaction is quenched/stopped quicker Allow 'it' will be faster Allow the NaHCO_3 reacts quicker Ignore just surface area is greater Comment: Give BOD for any reference to quicker / faster unless it is clear they are referring to rate of reaction between propanone and iodine	(1)

Question Number	Answer	Additional Guidance	Mark
2(b)(i)		<u>Example of graph</u>	(3)

	- axes the correct way around, labelled with units (1) - all points plotted within $\pm \frac{1}{2}$ a small square and straight line drawn (1) - suitable scale where plotted points cover at least half the graph paper along both axes (1)	Allow just 'vol / cm³' for y axis label Do not award 'T' for time, allow 't' Do not award M2 if the scale is non-linear	
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Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	- calculation of gradient (1) - units (1)	<u>Example of calculation</u> Gradient = $((21.0 - 8.0) \div (26 - 0.0) = (-) 0.50$ Allow 0.48 – 0.52 Allow TE from incorrect graph Ignore SF Ignore sign Do not award the final answer given as a fraction cm³ min⁻¹ If units are converted to cm³ s⁻¹ then the value must be correct Allow TE from incorrect units on graph If axes are inverted, units must reflect this and match the graph drawn Comment: If the axes are inverted, this gives a gradient of 2.0 and the unit should be min cm⁻³ Allow mins / minutes for min in the units	(1)

Question Number	Answer		Mark
2(c)	An answer that makes reference to the following point: zero and because the graph is a straight line/ constant gradient	Allow 0 for zero Allow linear / (directly) proportional	(1)

Question Number	Answer		Mark
2(d)	An answer that makes reference to the following point: (if the time is accurately known then) the volume / graph can still be plotted correctly	Allow the actual time doesn't matter as long as it is (accurately) known Ignore this would not change the gradient / the plots would still be on the line Ignore references to specific values on the graph	(1)

Question Number	Answer	Additional Guidance	Mark
2(e)	An answer that makes reference to the following points: - there is insufficient volume of reaction mixture left in the flask (to accurately pipette exactly 10.0 cm³) - titrate the remaining mixture directly in the flask or use a 5.0 cm³ pipette and double the titre volume	Allow the volume (of Na₂S₂O₃) is too small Allow there is only 10cm³ left / less than 10cm³ left Ignore just there is only 60 cm³ of reaction mixture Ignore just 'there will be some left in the flask' Allow add the sodium hydrogencarbonate into the flask Do not award pour the remaining mixture directly into the sodium hydrogencarbonate solution	(2)

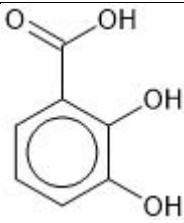
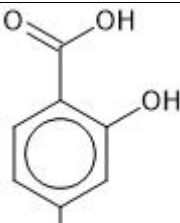
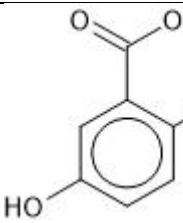
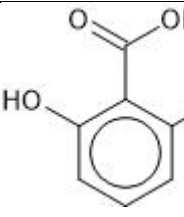
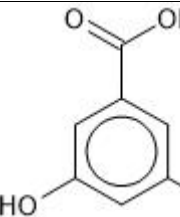
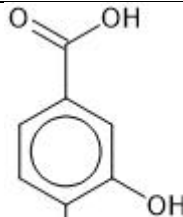
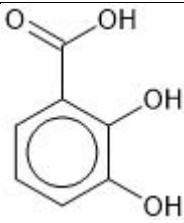
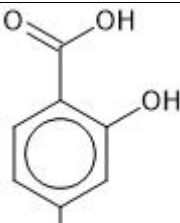
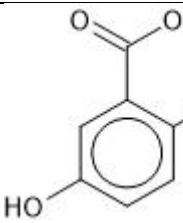
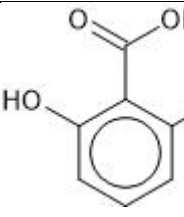
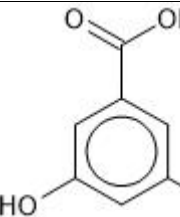
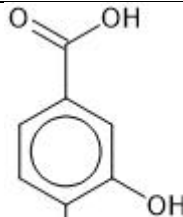
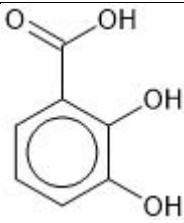
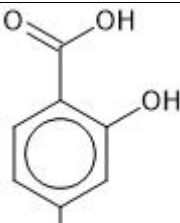
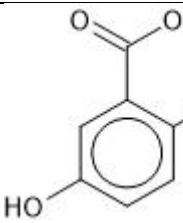
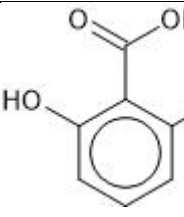
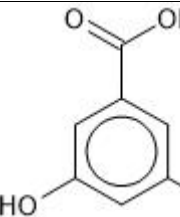
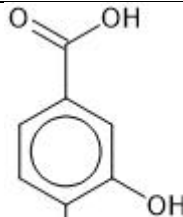
Question Number	Answer		Mark
2(f)	An answer that makes reference to the following point: (put the flask) in a water bath / oil bath (thermostatically controlled)	Allow use of an electric heater / hot plate Ignore control the temperature of the room/ air-conditioning / insulation / lid Ignore use of a thermometer Do not award extreme temperature ie 'ice bath' / boiling water Do not award oven Comment: Allow temperatures above the boiling point of propanone provided they are not above 100°C	(1)

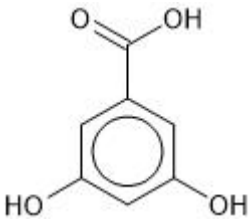
(Total for Question 2 = 11 marks)

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	An answer that makes reference to the following points: (solid A) (anhydrous) calcium chloride/ CaCl_2 (solid B) - soda lime	(1) Accept (anhydrous) calcium sulfate / CaSO_4 / sodium sulfate / Na_2SO_4 / magnesium sulfate / MgSO_4 Allow silica gel Do not award sulfuric acid / copper(II) sulfate cobalt chloride / calcium oxide (1) Accept potassium hydroxide / KOH / sodium hydroxide / NaOH calcium hydroxide / $\text{Ca}(\text{OH})_2$ / calcium oxide / CaO Allow lime Do not award limewater Ignore state symbols for both Correct substances in reverse order scores (1) Comment: Allow lime soda	(2)

Question Number	Answer	Additional Guidance	Mark																								
3(a)(ii)	- calculation of moles of carbon hydrogen and oxygen - division by lowest number of moles - simplest whole number ratio and empirical formula	<u>Example of calculation</u> <table border="1"> <tr> <th></th><th>Carbon</th><th>Hydrogen</th><th>Oxygen</th></tr> <tr> <td>%</td><td>54.5</td><td>3.90</td><td>41.6</td></tr> <tr> <td>A_r</td><td>12</td><td>1</td><td>16</td></tr> <tr> <td>mol</td><td>4.54</td><td>3.90</td><td>2.60</td></tr> <tr> <td>Division by smallest</td><td>1.75</td><td>1.50</td><td>1</td></tr> <tr> <td>Ratio</td><td>7</td><td>6</td><td>4</td></tr> </table> Empirical formula = $C_7H_6O_4$ Correct answer with no working scores (1) TE throughout eg use of atomic number for A_r Comment: $C_9H_8O_5$ with working scores (2) as a result of rounding the mols to 4.5, 4 and 2.5 which then gives a ratio of 9:8:5		Carbon	Hydrogen	Oxygen	%	54.5	3.90	41.6	A_r	12	1	16	mol	4.54	3.90	2.60	Division by smallest	1.75	1.50	1	Ratio	7	6	4	(3)
	Carbon	Hydrogen	Oxygen																								
%	54.5	3.90	41.6																								
A_r	12	1	16																								
mol	4.54	3.90	2.60																								
Division by smallest	1.75	1.50	1																								
Ratio	7	6	4																								

Question Number	Answer	Additional Guidance	Mark
3(b)	An answer that makes reference to the following points: - smoky flame indicates an aromatic compound/arene (1) - effervescence indicates a carboxylic acid /COOH (1) - no change with KMnO₄ indicates no alkene/C=C (1) - the formation of a white precipitate with bromine water indicates a phenol (1)	Allow reference to benzene ring for aromatic Ignore reference to unsaturated / high C:H ratio Allow just acid for carboxylic acid Ignore reference to lack of oxidation Allow C₆H₅OH for phenol Allow reaction with bromine water indicates phenol Ignore phenol if linked to decolourisation of bromine water Do not award phenyl Each conclusion must be linked with the correct test. If 4 correct deductions are given with no tests linked score (2), 2 or 3 correct deductions with no tests linked score (1)	(4)

Question Number	Answer	Additional Guidance	Mark						
3(c)	- any two correct structures - third correct structure - fourth correct structure	(1) (1) (1) <u>Examples of structures</u> <table><tr><td> 2,3 </td><td> 2, </td><td> 2,5 </td></tr><tr><td> 2,6 </td><td> 3,5 </td><td> 3,4 </td></tr></table> Accept any type of formulae or combination thereof Allow Kekule structure If there is only one phenyl OH group and a carboxylic acid group then award (2) for all 3 correct isomers, ignore any 4th structure Award (1) for 3 structural isomers that have 2 of the correct functional groups (phenyl OH / benzene / carboxylic acid) Penalise incorrect connectivity of the OH group and lack of delocalised ring once only	 2,3	 2,	 2,5	 2,6	 3,5	 3,4	(3)
 2,3	 2,	 2,5							
 2,6	 3,5	 3,4							

Question Number	Answer	Additional Guidance	Mark
3(d)	An answer that makes reference to the following points: - wavenumber of circled peak <i>and</i> appreciation that this indicates Q has (isolated) C–H (1) - only possible structure with just isolated C–H is 3,5-dihydroxybenzoic acid (1)	880 (cm⁻¹) Allow a range of 850-900 as it needs to be linked to the isolated C-H too Ignore references to other peaks too Ignore reference to lack of oxidation 	(2)

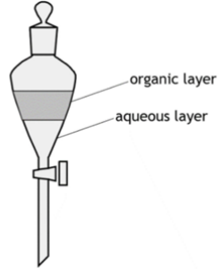
(Total for Question 3 = 14 marks)

Question Number	Answer	Additional Guidance	Mark
4(a)	An answer that makes reference to the following points: - concentrated hydrochloric acid is corrosive - nitrobenzene is toxic (by skin absorption)	(1) Allow just acid is corrosive Ignore hydrochloric acid is toxic/harmful /a strong acid Ignore references to tin (1) Do not award reference to toxicity by inhalation Ignore phenylamine is toxic Do not award nitrobenzene is corrosive	(2)

Question Number	Answer	Additional Guidance	Mark
4(b)	An answer that makes reference to the following point tin and (concentrated) HCl	Ignore [H]	(1)

Question Number	Answer	Additional Guidance	Mark
4(c)	An answer that makes reference to the following point neutralisation (of the excess HCl/acid)	Allow to react with the HCl Comment: Allow quench the acid Allow remove the acid	(1)

Question Number	Answer	Additional Guidance	Mark
4(d)	An answer that makes reference to the following point: it decreases the solubility of phenylamine (in the aqueous layer)	Allow to 'salt out' the phenylamine Allow to increase the polarity of the solution Allow 'it becomes less soluble' Allow it moves the phenylamine into the organic layer Allow increase the density of the aqueous layer Allow to aid separation of the layers	(1)

Question Number	Answer	Additional Guidance	Mark
4(e)(i)	An answer that makes reference to the following points - separating funnel with tap - two layers and upper layer labelled organic and lower labelled aqueous	<u>Example of diagram</u>  (1) The funnel must be capable of being stoppered but the stopper does not need to be shown Allow water / sodium chloride solution for aqueous Allow ether / ethoxyethane / phenylamine for organic Ignore size of layers (1) Do not award just a single line to separate the layers	(2)

Question Number	Answer	Additional Guidance	Mark
4(e)(ii)	An answer that makes reference to the following point: invert the (separating) funnel and open the tap	Ignore shake / swirl Allow just remove the stopper, Do not award invert and remove the stopper	(1)

Question Number	Answer	Additional Guidance	Mark
4(f)	An answer that makes reference to the following point: drying agent	Allow absorbs water / removes water Allow to dry the organic / ether layer Ignore to dry 'it' Do not award dehydration Do not award to react with ether / nitrobenzene	(1)

Question Number	Answer	Additional Guidance	Mark
4(g)	An answer that makes reference to the following points: - use of electrical heater / hot water bath / oil bath / hot plate (because) ether is highly flammable	(1) Do not award Bunsen burner / oven (1) Allow ether will be set alight Allow it has a low boiling point Do not award reference to flammability of any other compound Do not award M2 if a Bunsen burner has been suggested for M1	(2)

Question Number	Answer	Additional Guidance	Mark
4(h)	• calculation of mass of nitrobenzene (1) • calculation of moles of nitrobenzene $\div 123.0$ (1) • calculation of moles of phenylamine from 41.5% yield $\times 0.415$ (1) • calculation of mass of phenylamine formed and calculation of the volume of phenylamine formed $\times 93.0$ then $\div 1.03$ (1)	<u>Example of calculation</u> $m = (3.10 \times 1.20 =) 3.72 \text{ (g)}$ $n = (3.72 \div 123.0 =) 0.030244 \text{ (mol)}$ $n = (0.030244 \times 0.415 =) 0.012551 \text{ (mol)}$ $m = (0.012551 \times 93.0 =) 1.1673 \text{ (g)}$ $V = (1.1673 \div 1.03 =) 1.1333 / 1.133 / 1.13 / 1.1 \text{ (cm}^3\text{)}$ Allow TE throughout Ignore SF except 1 SF in final answer Correct answer with no working scores (4) 2.73 scores (3) for omission of step 3 Comment: If the final answer is close to the mark scheme answer, it may still be correct. Check for truncation of intermediate values (which is allowed if rounded correctly) and use your calculator to see if these values lead to the answer they have given	(4)

(Total for Question 4 = 15 marks)

TOTAL FOR PAPER = 50 MARKS