



Mark Scheme (Results)

Summer 2026

Pearson Edexcel International Advanced
Subsidiary Level In Chemistry
WCH13/01A

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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)	An answer that makes reference to the following point: carbon dioxide / CO₂	If name and formula given, both must be correct	(1)

Question Number	Answer	Additional Guidance	Mark
1(b)	An answer that makes reference to the following point: CaCO₃	Ignore calcium carbonate	(1)

Question Number	Answer	Additional Guidance	Mark
1(c)	An answer that makes reference to the following point: barium sulfate	Allow BaSO ₄ If name and formula given, both must be correct	(1)

Question Number	Answer	Additional Guidance	Mark
1(d)	An answer that makes reference to the following point: barium carbonate / BaCO₃	Allow TE from answers to (b) and (c) If name and formula given, both must be correct	(1)

Question Number	Answer	Additional Guidance	Mark
1(e)	An answer that makes reference to the following point: magnesium hydroxide / $\text{Mg}(\text{OH})_2$	If name and formula given, both must be correct	(1)

Question Number	Answer	Additional Guidance	Mark
1(f)	An answer that makes reference to the following point: magnesium sulfate / MgSO_4	If name and formula given, both must be correct Allow TE from (e)	(1)

(Total for Question 1 = 6 marks)

Question Number	Answer	Additional Guidance	Mark
2(a)	An answer that makes reference to the following points: - the colour of the (equilibrium mixture) will become paler orange / (more) yellow - because the equilibrium (position) shifts to the left (as the silver ions react (preferentially) with thiocyanate ions)	(1) Allow less orange / more pale Ignore less blood red Do not award goes colourless (1) Allow equilibrium shifts to favour the release of iron (III) ions / reactants Mark independently, but no TE	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)	An answer that makes reference to the following points: - the colour of the equilibrium mixture will become paler orange / (more) yellow - the (equilibrium) shifts in the endothermic direction (to the left-hand side)	(1) Allow less orange Ignore less blood red Do not award goes colourless (1) Allow favours the endothermic direction / moves to left as (forward) reaction is exothermic Ignore ΔH negative	(2)

Question Number	Answer	Additional Guidance	Mark
2(c)	An answer that makes reference to the following point: the colour of the original equilibrium mixture will become more orange	Allow the colour will become redder/ more blood red Ignore less yellow	(1)

Question Number	Answer	Additional Guidance	Mark
2(d)	An answer that makes reference to the following points: - the orange colour becomes more yellow / less orange (1) (because the equilibrium) shifts to the side with more (aqueous) moles / left hand side / reactant side (1)	Ignore less blood red Do not award goes colourless Allow favours the side with more (aqueous) moles / left hand side / reactant side	(2)

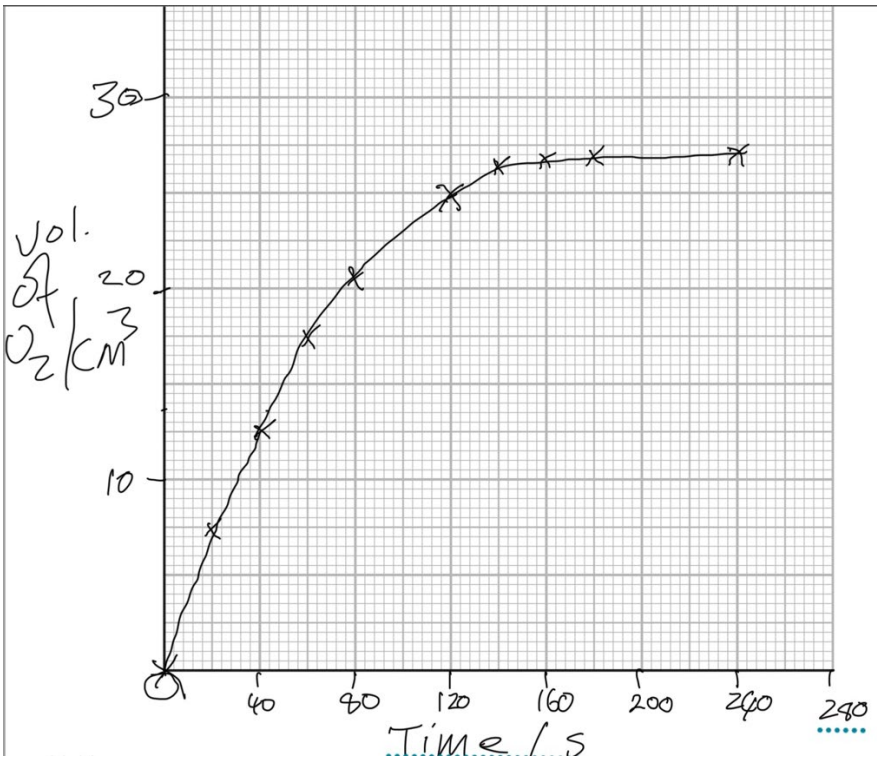
(Total for Question 2 = 7 marks)

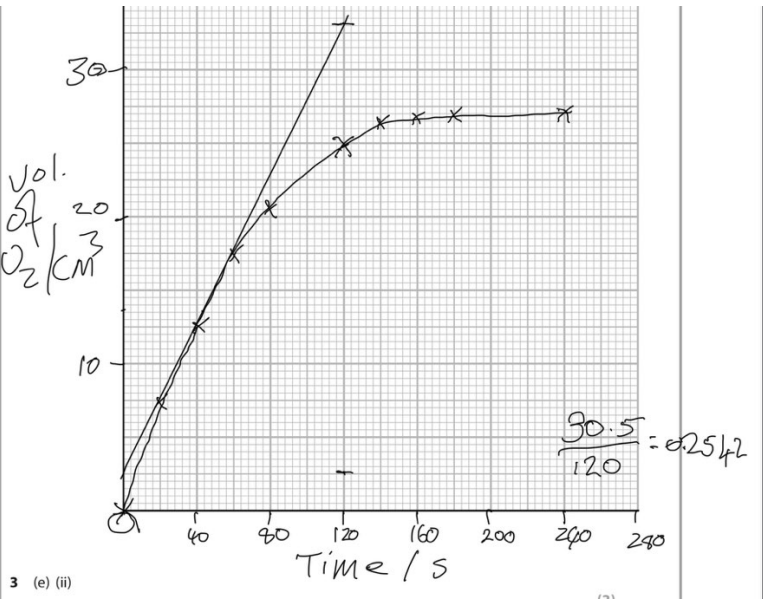
Question Number	Answer	Additional Guidance	Mark
3(a)	An answer that makes reference to the following points: - manganese (IV) oxide mass is unchanged - it is a catalyst so is not used up in a reaction	(1) Allow the mass is still 0.05 g (1) Do not award does not take part in the reaction	(2)

Question Number	Answer	Additional Guidance	Mark
3(b)	An answer that makes reference to the following point: balanced equation	<u>Example of equation</u> $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \frac{1}{2}\text{O}_2$ or $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$ Ignore state symbols even if incorrect Do not award if reaction arrow $\rightarrow$ is shown as a reversible arrow $\rightleftharpoons$ or $=$	(1)

Question Number	Answer	Additional Guidance	Mark
3(c)	An answer that makes reference to the following point: no gas is lost (from having to insert the bung)	Allow reduce the gas lost or less gas is lost Allow more accurate timing	(1)

Question Number	Answer	Additional Guidance	Mark
3(d)	An answer that makes reference to two of the following points: - amount of oxygen - amount of hydrogen peroxide and concentration of hydrogen peroxide alternative route - volume of oxygen and amount of oxygen - concentration of hydrogen peroxide	<u>Example of calculation</u> (1) $n = (20 \div (24 \times 1000 =) 0.00083333 / 8.333 \times 10^{-4} \text{ (mol)}$ $n = (0.00083333 \times 2 =) 0.0016667 / 1.6667 \times 10^{-3} \text{ (mol)}$ and (1) $c = (0.0016667 \times 1000) \div 10 = 0.16667 \text{ (mol dm}^{-3}\text{)}$ $v = (20 \times 2) \div 1000 = 0.04 \text{ (dm}^3\text{)}$ (1) $n = 0.04 \div 24 = 0.0016667 / 1.6667 \times 10^{-3} \text{ (mol)}$ (1) $c = (0.0016667 \times 1000) \div 10 = 0.16667 \text{ (mol dm}^{-3}\text{)}$ ignore SF except 1 SF Allow TE through out correct answer with no working scores 2	(2)

Question Number	Answer	Additional Guidance	Mark
3(e)(i)	- suitable scale on both axes to cover over half the grid (1) - labels with units on both axes and with time on the x axis (1) - all points plotted to within a small square and a smooth curve (1)	 Vol. of O_2 / cm^3 Time / s Allow V / v for volume and t for time Do not award T for time	(3)

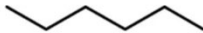
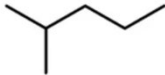
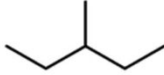
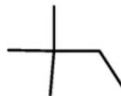
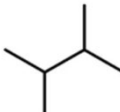
Question Number	Answer	Additional Guidance	Mark
3(e)(ii)	An answer that makes reference to the following points: - tangent to the curve at 13.5 cm³ O₂ (44s) (1) - calculation of rate (1) - units (a stand alone mark) (1)	 3 (e) (ii) rate = $((33 - 2.5) \div (120 - 0)) = 0.2542 / 0.25$ Allow range 0.21 to 0.26 cm³ s⁻¹ Allow cm³/s No TE on incorrect tangent Ignore SF except 1 SF	(3)

Question Number	Answer	Additional Guidance	Mark
3(e)(iii)	An explanation that makes reference to the following points: - the frequency of (successful / effective) collisions decrease - because the concentration of the reactant / hydrogen peroxide decreases	(1) Allow fewer collisions (1) Allow reactant / hydrogen peroxide used up Allow less hydrogen peroxide	(2)

Question Number	Answer	Additional Guidance	Mark
3(f)	An answer that makes reference to the following point: the same mistakes / errors will be made	Allow systematic error is not eliminated by repetition	(1)

Question Number	Answer	Additional Guidance	Mark
3(g)	An answer that makes reference to the following point: (volumetric) pipette / burette	Do not award dropping pipette, volumetric flask, syringe	(1)

(Total for Question 3 = 16 marks)

Question Number	Answer	Additional Guidance	Mark
4(a)	An answer that makes reference to the following points: • alkane name • skeletal formula	<u>Example of alkane and skeletal formula</u>  hexane  2-methylpentane  3-methylpentane  2,2-dimethylbutane  2,3-dimethylbutane Ignore displayed formulae even if incorrect Ignore missing or extra commas and dashes in name	(2)

Question Number	Answer	Additional Guidance	Mark
4(b)(i)	An answer that makes reference to the following point: To give space for liquid / needle to be inserted into the gas syringe	Allow the initial volume can be accurately determined	(1)

Question Number	Answer	Additional Guidance	Mark
4(b)(ii)	An answer that makes reference to the following point: to ensure there is no loss of alkane / to keep the alkane in the gas syringe	Allow loss of liquid / gas Allow to prevent water or additional air entering the syringe	(1)

Question Number	Answer	Additional Guidance	Mark
4(b)(iii)	An answer that makes reference to the following points: - to vaporise / evaporate the alkane - to maintain the temperature (at 80 °C) / keep the temperature constant	(1) Allow make the alkane gaseous (1) Allow so the temperature does not change between steps 3 and 7 Ignore uniform heating / temperature or even heating / temperature	(2)

Question Number	Answer	Additional Guidance	Mark
4(c)(i)	% uncertainty of the balance	<u>Example of calculation</u> % uncertainty = $((0.001 \times 2) \div 0.252) \times 100 =$ 0.79365% Ignore SF	(1)

Question Number	Answer	Additional Guidance	Mark
4(c)(ii)	% uncertainty of gas syringe	<u>Example of calculation</u> % uncertainty = $((0.5 \times 2) \div 85.0) \times 100 =$ 1.17647% Ignore SF	(1)

(Total for Question 4 = 8 marks)

Question Number	Answer	Additional Guidance	Mark
5(a)	An answer that makes reference to the following point: (to cool it down because) propan-1-ol would evaporate / is volatile.	Allow The reaction is exothermic / heat is released Ignore references to the flask being too hot to handle Ignore flammability of propan-1-ol Do not award references to explosion Do not award propanal evaporating	(1)

Question Number	Answer	Additional Guidance	Mark
5(b)	An answer that makes reference to the following points: there is no opening between the condenser and the collecting flask. and (so) there is build up of pressure	Allow no outlet for gases Allow risk of explosion Do not award any other error	(1)

Question Number	Answer	Additional Guidance	Mark
5(c)	An answer that makes reference to the following point: the reaction mixture is mainly water	Allow the maximum boiling temperature of the reaction components is 100 °C Ignore just boiling temperature of water is 100 °C	(1)

Question Number	Answer	Additional Guidance	Mark
5(d)	An answer that makes reference to two of the following points: - water and propan-1-ol have hydrogen bonds (between molecules) (1) - propanal has permanent dipole(-dipole interactions) (1) (between molecules) - hydrogen bonds are the strongest / stronger intermolecular force (so propanal has the lower boiling temperature) (1)	Do not award abbreviations for the intermolecular forces e.g idid, pd-pd, vdw Allow H bonding / h bonding Allow more energy to overcome hydrogen bonds Allow reverse argument Do not award if just bonds are broken Ignore IMF	(3)

Question Number	Answer	Additional Guidance	Mark
5(e)	An answer that makes reference to the following point: • (anhydrous) calcium chloride / CaCl_2 or (anhydrous) magnesium sulfate / MgSO_4	Allow (anhydrous) sodium sulfate Na_2SO_4 Allow (anhydrous) calcium sulfate CaSO_4 Do not award copper sulfate	(1)

Question Number	Answer	Additional Guidance	Mark
5(f)	An answer that makes reference to the following points: • calculation of mass of propan -1-ol • amount propan-1-ol • theoretical mass of propanal • % yield and answer to 2/3SF Alternative route • amount of propanal • mass propan-1-ol • amount propan-1-ol • % yield and answer to 2/3SF	Example of calculation (1) $m (2.00 \times 0.804 \Rightarrow) 1.608 \text{ (g)}$ (1) $n (= 1.608 \div 60 \Rightarrow) 0.0268 \text{ (mol)}$ (1) $m = (0.0268 \times 58 \Rightarrow) 1.5544 \text{ (g)}$ (1) $\text{yield} = ((1.12 \div 1.5544) \times 100 = 72.05)$ $= 72.1 / 72 \text{ (\%)}$ (1) $n (= 1.12 \div 58 \Rightarrow) 0.019310 \text{ (mol)}$ (1) $m (2.00 \times 0.804 \Rightarrow) 1.608 \text{ (g)}$ (1) $n (= 1.608 \div 60 \Rightarrow) 0.0268 \text{ (mol)}$ (1) $\text{yield} = ((0.019310 \div 0.026800) \times 100 = 72.05)$ $= 72.1 / 72 \text{ (\%)}$ Allow TE throughout but M4 depends on two mol Mr calculations Correct answer with no working scores 4	(4)

Question Number	Answer	Additional Guidance	Mark
5(g)	An answer that makes reference to two of the following points: • a suitable chemical test for an acid • result for propanoic acid and result for propan-1-ol	(1) Suitable acid/base indicator / addition of a carbonate / hydrogen carbonate Acid colour of indicator / effervescence / gas turns limewater goes cloudy (1) No change / no reaction / no observation with propan-1-ol Ignore tests for aldehyde even if incorrect Do not award PCl_5 or PCl_3	(2)

(Total for Question 5 = 13 marks)
TOTAL FOR PAPER = 50 MARKS

