CAMBRIDGE
International Education

# Cambridge O Level

**CHEMISTRY** **5070/41**

Paper 4 Alternative to Practical **May/June 2026**

MARK SCHEME

Maximum Mark: 40

**Published**

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.



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**General marking principles**

All examiners must apply these marking principles when marking candidate responses.

| | |
|---|---|
| 1 | Examiners must award marks for each response in line with:<br><br>• the specific **content** defined in the mark scheme<br>• the specific **skills** defined in the mark scheme or in the level descriptions<br>• the **standard of response** required as exemplified by the standardisation scripts. |
| 2 | Examiners must award **whole marks** (not half marks, or other fractions). |
| 3 | Examiners must award marks **positively**. This means that:<br><br>• marks are not deducted for errors or omissions<br>• marks are awarded for correct/valid answers as defined in the mark scheme and also for **other valid answers** which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate<br>• the quality of spelling, punctuation and grammar are judged **only** when the mark scheme indicates that these features are **specifically assessed** in the question. However, the meaning of all responses must be unambiguous. |
| 4 | Examiners must **consistently** apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly. |
| 5 | Examiners must use the **full range of marks** defined in the mark scheme, unless limited by the quality of the candidate responses seen. |
| 6 | Examiners must award marks according to the mark scheme and **must not** award marks with grade thresholds or grade descriptions in mind. |

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**Science-Specific Marking Principles**

| | |
|---|---|
| 1 | Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly. |
| 2 | The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored. |
| 3 | Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection). |
| 4 | The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted. |
| 5 | 'List rule' guidance<br><br>For questions that require ***n*** responses (e.g. State **two** reasons …):<br><br>• The response should be read as continuous prose, even when numbered answer spaces are provided.<br>• Any response marked *ignore* in the mark scheme should not count towards ***n***.<br>• Incorrect responses should not be awarded credit but will still count towards ***n***.<br>• Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response.<br>• Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science. |

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6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient ($a$) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

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**Annotations guidance for centres**

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

**Annotations**

| Annotation | Meaning |
|---|---|
|  | correct point or mark awarded |
|  | incorrect point or mark not awarded |
|  | information missing or insufficient for credit |
|  | incorrect or insufficient point ignored while marking the rest of the response |
|  | contradiction in response, mark not awarded |
|  | benefit of the doubt given |
|  | error carried forward applied |
|  | incorrect point or mark not awarded |
|  | rounding error |

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| Annotation | Meaning |
|---|---|
| SEEN | point has been noted, but no credit has been given<br>or<br>blank page seen |
| SF | error in number of significant figures |
| ✓ 1 | correct awarding one mark from marking point or marking group 1.<br>similar numbered ticks are used for marking point or marking groups 2, 3, 4 etc. |
|  | pages are linked together |
|  | used to highlight part of the response |
|  | key point attempted / working towards marking point / incomplete answer / response seen but not credited / blank page seen |
|  | unclear response |

**Abbreviations used within Mark Scheme**

| Abbreviation | Meaning |
|---|---|
| ECF | error carried forward |
| ORA | Or reverse argument |
| CON | contradiction in response, mark not awarded |

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| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1(a) | To prevent the dye dissolving / washing into the solvent | **1** | **ALLOW** mixing with / spreading out into the solvent / dyes mixing together<br>**ALLOW** so the dots move up the paper<br>**ALLOW** 'water' for 'solvent'<br>**REJECT** to prevent the baseline / it dissolving into the solvent |
| 1(b) | **M1 A** and **C** contain only one coloured compound<br>**M2 B** contains two (coloured) compounds | **2** | **ALLOW A** and **C** are pure<br>**ALLOW** dye / pigment / colour / substance for coloured compound. |
| 1(c) | Dye **D** is insoluble (in the solvent) | **1** | **ALLOW** 'water' for 'solvent' |
| 1(d) | It prevents / reduces the solvent evaporating | **1** | **ALLOW** 'water' for 'solvent'<br>**IGNORE** escaping |
| 1(e) | A spot in line with the spot for **A** and a spot in line with the spot for **C**. | **1** | |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 2(a)(i) | 121.7 (g) | **1** | |
| 2(a)(ii) | 123.7 | **1** | **ECF 2(a)(i)** + 2.00 |
| 2(a)(iii) | Reaction has finished | **1** | **ALLOW** one of the reactants is used up etc.<br>**ALLOW** no more gas is being released |

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>2(a)(iv)</td><td>M1 both axes labelled with units and suitable scale for x axis<br><br>M2 points plotted correctly ± half a small square</td><td>2</td><td>M1 Linear scale to cover at least half of the graph paper with sensible increments<br><br>M2 IGNORE point at time 0<br><br>If axes labels are reversed but scales are correct then M2 can score.<br><br>REJECT if scale nonlinear.<br><br>
<table>
<tr><th>time/s</th><th>total mass/g</th></tr>
<tr><td>0</td><td></td></tr>
<tr><td>30</td><td>122.9</td></tr>
<tr><td>60</td><td>122.5</td></tr>
<tr><td>90</td><td>122.2</td></tr>
<tr><td>120</td><td>122.1</td></tr>
<tr><td>150</td><td>122.1</td></tr>
</table>
</td></tr>
<tr><td>2(a)(v)</td><td>Smooth curve within half a small square of each point</td><td>1</td><td>ECF If points are plotted incorrectly then award mark if line is a reasonable best fit for the points plotted.<br>REJECT multiple lines at any point on the curve<br>REJECT point to point straight lines</td></tr>
<tr><td>2(b)(i)</td><td>So liquid cannot escape</td><td>1</td><td>ALLOW prevent spitting / splashing<br>IGNORE spilling / evaporation</td></tr>
<tr><td>2(b)(ii)</td><td>So gas / carbon dioxide can escape</td><td>1</td><td>ALLOW an incorrectly named gas (name of gas is tested in 2(c))<br>ALLOW to allow air out<br>REJECT cotton wool absorbs gas</td></tr>
</table>

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| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 2(b)(iii) | (Precision error) in measuring volume of acid / mass of flask / volume not measured to 1 dp / mass only measured to 1 dp | 1 | **ALLOW** any reasonable description of a precision error<br>**ALLOW** use burette / pipette instead of measuring cylinder<br>**ALLOW** delay in starting the stop-watch |
| 2(c) | Carbon dioxide / $CO_2$ / gas is lost / escapes from the flask | 1 | **IGNORE** produced / released / given off alone (gas produced is insufficient)<br>**ALLOW** produced / released / given off from the flask<br>Incorrect gas is a **CON**. |
| 2(d) | **M1** Draw tangent (to the curve at t=0)<br>**M2** Calculate the gradient | 2 | **ALLOW** calculate the gradient of the tangent for 2 marks<br>**M2 ALLOW** difference in mass ÷ time taken |
| 2(e) | **M1** as the concentration decreases the rate decreases ORA<br>**M2** the steepness of the line / curve / gradient decreases as the mass decreases | 2 | **M1 ALLOW** (directly) proportional<br>**M2 ALLOW** concentration decreases as mass decreases / reagents are used up |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 3(a) | **M1** (bromine) changes from orange<br><br>**M2** turns colourless | 2 | **M1 ALLOW** brown-orange / red-orange / yellow-orange / brown-red / brown<br>**IGNORE** clear<br>**M2 ALLOW** decolourises bromine water / aqueous bromine |
| 3(b)(i) | Effervescence / bubbles / fizzing | 1 | **IGNORE** gas produced |
| 3(b)(ii) | **M1** hydrogen<br>**M2** lighted splint **and** pop sound | 2 | **M2 ECF** for wrong gas |
| 3(c) | **M1** white precipitate<br><br>**M2** soluble in excess/colourless solution/(white) precipitate dissolves | 2 | **IGNORE** clear<br>**M1** white does not score unless linked to precipitate/solid<br>**M2 ALLOW** independent of **M1** i.e. if wrong colour precipitate for **M1** then soluble can score **M2** |
| 3(d)(i) | Steam / water | 1 | |

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| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 3(d)(ii) | Solid / **Y** (contains) water of crystallisation / **Y** is hydrated / **Y** becomes anhydrous | **1** | **ALLOW Y** decomposes (and produces water) |
| 3(e)(i) | Sulfur dioxide | **1** | |
| 3(e)(ii) | **M1** add barium nitrate and nitric acid<br><br>**M2** white precipitate | **2** | **M1 ALLOW** acidified barium nitrate<br>**M1 ALLOW** use acidified barium chloride |
| 3(f)(i) | Iron(II) / $Fe^{2+}$ | **1** | |
| 3(f)(ii) | (precipitate) oxidises / $Fe^{3+}$ formed / reacts with oxygen or air | **1** | |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 4 | Apparatus<br>• Thermometer **and** balance<br><br>Method<br>**Any three from:**<br>• Measure the initial temperature of some ice **and** the lowest / minimum temperature reached<br>• Add a measured mass of salt to the ice<br>• Stir<br>• Repeat with different masses of salt<br>• Repeats **and** takes an average with **same** mass of salt<br><br>Variable<br>• Use a constant mass of ice / keep mass of ice constant<br><br>Conclusion<br>• If the temperature is lower when a greater mass of salt is used then the student is correct | **6** | **ALLOW** initial and final temperature<br><br>**ALLOW** amount for mass<br><br>**ALLOW** highest / biggest / greatest temperature change / difference in temperature |

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