



National
Qualifications
2026

2026 Chemistry

National 5

Question Paper Finalised Marking Instructions

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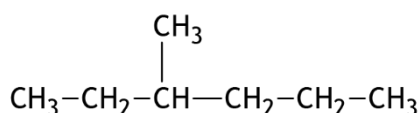
General marking principles for National 5 Chemistry

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this paper. These principles must be read in conjunction with the detailed marking instructions, which identify the key features required in candidate responses.

- (a) Marks for each candidate response must always be assigned in line with these general marking principles and the detailed marking instructions for this assessment.
- (b) If a specific candidate response does not seem to be covered by either the principles or detailed marking instructions, and you are uncertain how to assess it, you must seek guidance from your team leader.
- (c) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.

A guiding principle in marking is to give credit for correct chemistry rather than to look for reasons not to award marks.

Example 1: The structure of a hydrocarbon found in petrol is shown below.



Name the hydrocarbon.

Although the punctuation is not correct, '3, methyl-hexane' should gain the mark.

Example 2: A student measured the pH of four carboxylic acids to find out how their strength is related to the number of chlorine atoms in the molecule.

The results are shown in the table.

<i>Structural formula</i>	<i>pH</i>
CH ₃ COOH	1.65
CH ₂ ClCOOH	1.27
CHCl ₂ COOH	0.90
CCl ₃ COOH	0.51

State how the strength of the acids is related to the number of chlorine atoms in the molecule.

Although not completely correct, an answer such as 'the more Cl₂, the stronger the acid' should gain the mark.

- (d) There are no half marks awarded.
- (e) Candidates must respond to the 'command' word as appropriate and may be required to write extended answers in order to communicate fully their knowledge and understanding.

- (f) Marks should be awarded for answers that have incorrect spelling or loose language **as long as the meaning of the word(s) is conveyed**. **Example:** Answers like ‘distilling’ (for ‘distillation’) and ‘it gets hotter’ (for ‘the temperature rises’) should be accepted.

However, the example below would not be given any credit, as an incorrect chemical term, which the candidate should know, has been given.

Example: If the correct answer is ‘ethene’, and the candidate’s answer is ‘ethane’, this should not be accepted.

- (g) A correct answer followed by a wrong answer should be treated as a cancelling error and no marks should be awarded.

Example: State what colour is seen when blue Fehling’s solution is warmed with an aldehyde.

The answer ‘red, green’ gains no marks.

If a correct answer is followed by additional information which does not conflict, the additional information should be ignored, whether correct or not.

Example: State why the tube cannot be made of copper.

If the correct answer is related to a low melting point, ‘Copper has a low melting point and is coloured grey’ would not be treated as having a cancelling error.

- (h) Unless a numerical question specifically requires evidence of working to be shown, full marks should be awarded for a correct final answer (including units if required) on its own.

The partial marks shown in the marking scheme are for use when working is given but the final answer is incorrect. An exception is when candidates are asked to ‘Find, by calculation’, when full marks cannot be awarded for the correct answer without working.

- (i) In most questions units are not required. However, if the candidate writes units then they must be correct. An incorrect unit would not be acceptable and one mark would not be awarded.

This marking instruction must only be applied a maximum of once per paper.

- (j) Where the marking instructions specifically allocate a mark for units in a calculation, this mark should not be awarded if the units are incorrect or missing. Missing or incorrect units at intermediate stages in a calculation should be ignored.

- (k) As a general rule, where a wrong numerical answer (already penalised) is carried forward to another step, credit will be given provided the result is used correctly. The exception to this rule is where the marking instructions for a numerical question assign separate ‘concept marks’ and an ‘arithmetic mark’. In such situations, the marking instructions will give clear guidance on the assignment of partial marks.

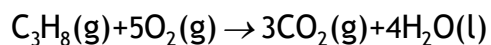
- (l) Ignore the omission of one H atom from a full structural formula provided the bond is shown or one carbon to hydrogen bond missing provided the hydrogen is shown.

- (m) A symbol or correct formula should be accepted in place of a name **unless stated otherwise in the marking instructions**.

- (n) When formulae of ionic compounds are given as answers it will only be necessary to show ion charges if these have been specifically asked for. However, if ion charges are shown, they must be correct. If incorrect charges are shown, no marks should be awarded.

- (o) If an answer comes directly from the text of the question, no marks should be awarded.

Example: A student found that 0.05 mol of propane, C₃H₈ burned to give 82.4 kJ of energy.



Name the type of enthalpy change which the student measured.

No marks should be awarded for 'burning' since the word 'burned' appears in the text.

- (p) Unless the question is clearly about a non-chemistry issue, eg costs in industrial chemical process, a non-chemical answer gains no marks.

Example: Suggest why the (catalytic) converter has a honeycomb structure.

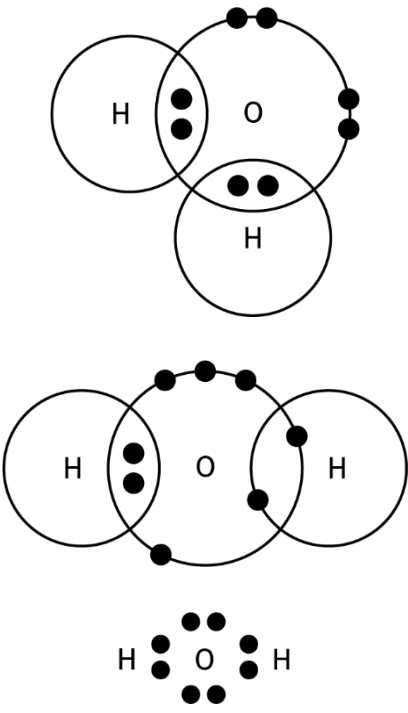
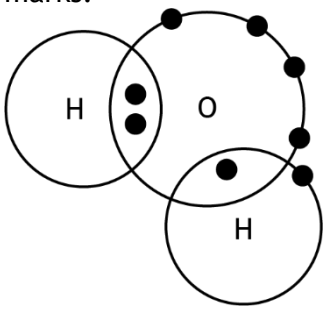
A response such as 'to make it work' may be correct but it is not a chemical answer and the mark should not be awarded.

Marking instructions for each question

Section 1

Question	Answer	Mark
1.	B	1
2.	D	1
3.	C	1
4.	B	1
5.	A	1
6.	D	1
7.	A	1
8.	D	1
9.	C	1
10.	A	1
11.	B	1
12.	D	1
13.	B	1
14.	A	1
15.	C	1
16.	A	1
17.	D	1
18.	C	1
19.	B	1
20.	C	1
21.	B	1
22.	C	1
23.	A	1
24.	A	1
25.	D	1

Section 2

Question			Expected response	Max mark	Additional guidance
1.	(a)		Same atomic number/number of protons but different mass number/number of neutrons.	1	Mention of molecules/compounds negates. Accept: "same element" in place of same atomic number/same number of protons.
	(b)	(i)	${}^3_1\text{H}$	1	Award 0 marks for ${}^3\text{H}$ Do not penalise if atomic number and mass number are on the right hand side.
		(ii)	It's an average (mass).	1	
		(iii) (A)	20 (g)	1	Unit not required but if given must be correct. This marking instruction must only be applied a maximum of once per paper.
		(iii) (B)	Diagram showing two hydrogen atoms and one oxygen atom with two pairs of bonding electrons and two non-bonding pair of electrons in oxygen eg 	1	Either the oxygen or both hydrogen symbols must be shown. Accept: cross or dot or e to represent electrons or a mixture of these Accept: petal diagram for oxygen but not for hydrogen The non-bonding electrons in oxygen must be shown but do not need to be shown as a pair or be together or be on the line. Bonding electrons MUST be on the line or in the overlapping area. The example below is awarded 0 marks.  If inner electrons on oxygen are shown they must be correct ie 2,8.

Question			Expected response	Max mark	Additional guidance
2.	(a)	(i)	C ₂ H ₂	1	
		(ii)	Alkene and cycloalkane. OR Alkyne and cycloalkene.	1	
		(iii)	Cycloalkene	1	
	(b)		Does not contain carbon to carbon double bond. OR It is saturated. OR There are only carbon to carbon single bonds.	1	0 marks are awarded for single bonds or double bonds without carbon to carbon but does not negate a correct answer.
	(c)	(i)	3	1	
		(ii)	210 (g)	1	Unit not required but if given must be correct. This marking instruction must only be applied a maximum of once per paper.

Question			Expected response	Max mark	Additional guidance
3.	(a)		Calcium carbonate	1	
	(b)		$\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$	1	Accept: correct multiples.
	(c)	(i)	It would stop bubbling/fizzing/no more gas produced/no more reacts/no more solid remains.	1	Do not accept pH of acid no longer changing without a correct test. Any mention of dissolving negates a correct answer.
		(ii)	<p>2.2 ($\text{cm}^3 \text{ s}^{-1}$)</p> <p>-----</p> <p>Partial marking</p> <p>66/30 (1 mark)</p>	2	<p>Unit not required but if given must be correct.</p> <p>This marking instruction must only be applied a maximum of once per paper.</p> <p>Award 1 mark for correct method (ie change in volume/change in time) but incorrect arithmetic using correct values from table.</p> <p>Award 1 mark for correct method but incorrect matching values from the table used (subtractions must be shown).</p> <p>Award 0 marks if correct method is used but values used are not in the table.</p> <p>Award 0 marks if incorrect method used (ie change in time/change in volume).</p>
		(iii)	Mass, pH, concentration, conductivity.	1	<p>If candidate mentions an incorrect direction of change for a correct alternative measurement this would negate the type of measurement.</p> <p>0 marks awarded if mass of limestone/CaCO_3 is specified.</p> <p>Do not accept units in place of measurement.</p>
		(iv)	<p>Reactant(s) being used up.</p> <p>OR</p> <p>Concentration (of acid) decreases.</p> <p>OR</p> <p>Surface area/size/mass (of limestone/CaCO_3) decreases.</p>	1	

Question			Expected response	Max mark	Additional guidance								
4.	(a)		Two different monomers.	1	Naming the monomers is not acceptable on its own but does not negate a correct answer.								
	(b)		<div>$\begin{array}{c} \text{CH}_3 \\ \\ \text{C}=\text{O} \\ \\ \text{O} \\ \\ \text{H} \quad \text{C}=\text{C} \\ \quad \\ \text{H} \quad \text{H} \end{array}$</div>	1	Accept: a full structural formula, shortened structural formula or a mix								
	(c)		<table><tr><th>Percentage (of vinyl acetate (%))</th><th>Elastic modulus (GPa)</th></tr><tr><td>12</td><td>91</td></tr><tr><td>18</td><td>33</td></tr><tr><td>28</td><td>12</td></tr></table> <p>1 mark for headings and units.</p> <p>1 mark for correctly matched values.</p>	Percentage (of vinyl acetate (%))	Elastic modulus (GPa)	12	91	18	33	28	12	2	
Percentage (of vinyl acetate (%))	Elastic modulus (GPa)												
12	91												
18	33												
28	12												
	(d)		Vinyl chloride	1									

Question			Expected response	Max mark	Additional guidance
5.	(a)		<p>9.614 / 9.61 / 9.6 / 10 (kJ)(3 marks)</p> <p>-----</p> <p>Partial marking</p> <p>Using $cm\Delta T$ with $c = 4.18$. (1 mark)</p> <p>To be awarded this concept mark, candidates do not specifically need to write $cm\Delta T$. The concept mark is awarded for using this relationship with three values, one of which must be 4.18.</p> <p>For values 0.1 (kg) and 23 ($^{\circ}C$). (1 mark)</p> <p>A further mark can be awarded for arithmetical follow through to the candidate's answer only if the mark for the $cm\Delta T$ concept has been awarded. (1 mark)</p>	3	<p>An answer in Joules can only be awarded marks if used with 4180 and the correct unit is given.</p> <p>Unit is not required if answer given in kilojoules, however a maximum of 2 marks can be awarded for the correct value with incorrect unit.</p> <p>This marking instruction must only be applied a maximum of once per paper.</p>
	(b)		To reduce heat loss or correct description.	1	<p>Award 1 mark for it is a better insulator.</p> <p>Do not penalise stop/prevent.</p> <p>Any mention of absorbing is awarded 0 marks.</p>
	(c)		<p>The axis/axes of the graph has/have suitable scale(s). For the graph paper provided within the question paper, the selection of suitable scales will result in a graph (plotted points) that occupies at least half of the width and half of the height of the graph paper. (1 mark)</p> <p>All data points plotted accurately (within a half box tolerance) with a line of best fit drawn. This mark can only be accessed if linear scales for both axes have been used. (1 mark)</p>	2	
	(d)		63-65	1	Mark is awarded if candidates answer is correct for their line of best fit in 5(c).

Question			Expected response	Max mark	Additional guidance
6.			<p>This is an open-ended question.</p> <p>1 mark: The student has demonstrated a limited understanding of the chemistry involved. The candidate has made some statement(s) that is/are relevant to the situation, showing that at least a little of the chemistry within the context is understood.</p> <p>2 marks: The student has demonstrated a reasonable understanding of the chemistry involved. The student makes some statement(s) that is/are relevant to the situation, showing that the context is understood.</p> <p>3 marks: The maximum available mark would be awarded to a student who has demonstrated a good understanding of the chemistry involved. The student shows a good comprehension of the chemistry of the situation and has provided a logically correct answer to the question posed. This type of response might include a statement of the principles involved, a relationship or an equation, and the application of these to respond to the context. This does not mean the answer has to be what might be termed an “excellent” answer or a “complete” one.</p>	3	

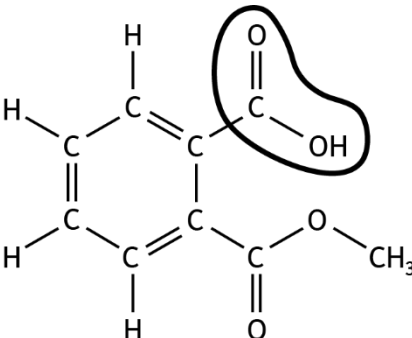
Question			Expected response	Max mark	Additional guidance
7.	(a)	(i)	(Oxygen) relights a glowing splint.	1	Do not accept burning splint.
		(ii)	Carbon dioxide and water. Both required for 1 mark .	1	Accept: correct formulae
	(b)	(i)	As the number of branches increases, so does the octane number. OR As the number of branches decreases the octane number decreases.	1	Cause and effect must be correct. As the octane number increases, the number of branches increases would be awarded 0 marks . Higher efficiency/more efficient is acceptable in place of higher octane number.
		(ii)	2,2,4-trimethylpentane	1	
	(c)	(i)	Addition	1	
		(ii)	$ \begin{array}{ccccccc} & \text{H} & & \text{CH}_3 & & \text{CH}_3 & \\ & & & & & & \\ \text{H} & - \text{C} & - & \text{C} & - & \text{C} & - \text{C}_2\text{H}_5 \\ & & & & & & \\ & \text{C}_2\text{H}_5 & & \text{H} & & \text{H} & \end{array} $	1	Accept: a full structural formula, shortened structural formula or a mix

Question			Expected response	Max mark	Additional guidance
8.	(a)		Uranium and thorium	1	
	(b)		UO ₂	1	
	(c)		<p>276 days</p> <p>-----</p> <p>Partial marking</p> <p>2 half lives (1 mark)</p> <p>If incorrect number of half lives is calculated then 1 mark can be awarded for 138 x candidate's number of half lives provided the arithmetic is correct.</p> <p>2 x 138 = 276 (2 marks)</p> <p>1 mark for the correct unit.</p>	3	<p>If half-life calculation has been carried out using radium a maximum of 2 marks could be awarded.</p> <p>Calculating the number of half lives as 2. (1 mark)</p> <p>Calculating the time taken using the half life of radium with the appropriate unit of years. (1 mark)</p> <p>2 x 1600 = 3200 years. (2 marks)</p>
	(d)		Atomic number/number of protons decreases.	1	Award 0 marks for any mention of mass number decreasing but this does not negate a correct answer.

Question			Expected response	Max mark	Additional guidance
9.	(a)	(i)	Aluminium's value should be larger than that of zinc/higher than zinc. OR Aluminium is higher than zinc in the electrochemical series but has a lower voltage. OR The order should be magnesium, aluminium, zinc, iron (or the reverse).	1	Accept: the reverse if it is clear that the candidate is referring to the zinc in comparison to the aluminium Accept: reactivity/reactivity series in place of electrochemical series Conductivity is not accepted in place of voltage.
		(ii)	Ions are free to move.	1	Any mention of electrons negates a correct response.
	(b)	(i)	Arrow from zinc to copper on the wire.	1	
		(ii)	To complete the circuit/allow ions to flow.	1	Any mention of electrons negates a correct response.
	(c)	(i)	1.10 / 1.1 (V) ----- Partial marking 0.34 - (-0.76) with an incorrect answer. (1 mark) -0.76 - 0.34 = -1.10. (1 mark)	2	If a candidate chooses one incorrect value and one correct value then one mark can be awarded for correct arithmetic. The correct value must be in the correct position. ie 0.34 - (a value from the table). OR (A value from the table) - (-0.76). 1 (V) is not accepted as a correctly rounded answer. Unit not required but if given must be correct. This marking instruction must only be applied a maximum of once per paper.
		(ii)	$\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$	1	State symbols are not required but, if given, must be correct.

Question			Expected response	Max mark	Additional guidance
9.	(c)	(iii)	<p>39.875/39.88/39.9/40 (g)</p> <p>-----</p> <p>Partial marks can be awarded for a maximum of two of the following three steps:</p> <p>1 mark for correctly calculating the number of moles of copper(II) sulfate.</p> <p>$n = CV = 0.25 \times 1 = 0.25\text{mol.}$</p> <p>1 mark for correctly calculating the <i>GFM</i> of copper(II) sulfate.</p> <p>$GFM = 159.5.$</p> <p>1 mark for calculating the mass of copper(II) sulfate.</p> <p>$m = n \times GFM$ using candidates calculated moles of copper(II) sulfate and candidates calculated <i>GFM</i>.</p>	3	<p>Unit not required but if given must be correct.</p> <p>This marking instruction must only be applied a maximum of once per paper.</p> <p>An incorrect number of moles or <i>GFM</i> of copper(II) sulfate must be supported by working.</p>

Question			Expected response	Max mark	Additional guidance				
10.	(a)	(i)	They have the same general formula. AND Have similar/same chemical properties. Both are required for 1 mark .	1	Award 0 marks for: - Molecular formula - Structural formula - Chemical formula Award 0 marks for physical properties in place of chemical properties however this does not negate if given in addition to chemical properties.				
		(ii)	Hydroxyl	1	Award 0 marks for OH/hydroxide/OH ⁻ .				
	(b)		11.2 (g)	1	Unit not required but if given must be correct. This marking instruction must only be applied a maximum of once per paper. Rounded answers must be supported by working.				
	(c)	(i)	CH ₃ OH + CH ₃ COOH ⇌ C ₃ H ₆ O ₂ + H ₂ O ----- Partial marking 1 mark - use of reversible arrow. 1 mark - all reactants and products on correct side of arrow.	2	If reversible arrow is used then reactants and products can be interchanged. Accept: ⇌/↔ or ⇌/↔ or ↔ for the reversible arrow. Ignore state symbols.				
		(ii)	Electric hotplate/water bath. OR Any correct laboratory heating method that does not involve a naked flame.	1	0 marks awarded for any mention of a non-laboratory heating method.				
		(iii)	1 mark for each correct answer. <table><tr><td>Alcohol</td><td>Carboxylic Acid</td></tr><tr><td>propan-1-ol/ 1-propanol</td><td>butanoic acid</td></tr></table>	Alcohol	Carboxylic Acid	propan-1-ol/ 1-propanol	butanoic acid	2	Any mention of propanol/ propan-2-ol/2-propanol negates the awarding of 1 mark .
Alcohol	Carboxylic Acid								
propan-1-ol/ 1-propanol	butanoic acid								

Question			Expected response	Max mark	Additional guidance
10.	(c)	(iv)		1	

Question			Expected response	Max mark	Additional guidance
11.	(a)	(i)	Exothermic/exothermal	1	
		(ii)	Lilac	1	
	(b)		H ⁺ /hydrogen ions are present.	1	0 marks awarded for hydrogen.
	(c)	(i)	21.4 (cm ³)	1	Unit not required but if given must be correct. This marking instruction must only be applied a maximum of once per paper.

Question			Expected response	Max mark	Additional guidance
11.	(c)	(ii) (A)	<p>0.02675/0.0268/0.027/0.03 (mol l⁻¹) -----</p> <p>Partial marking</p> <p>Method A</p> <p>1 mark for the correct number of moles of permanganate ions using the candidate's answer from 11(c)(i). ie $n = CV = 0.0214 \times 0.005$ $= 0.000107 \text{ mol.}$ (1 mark)</p> <p>1 mark for calculating the moles of iron(II) ions by correctly applying the mole ratio to their calculated number of moles of permanganate ions. ie 5 x candidate's calculated number of moles of permanganate ions. (1 mark)</p> <p>A correctly calculated number of moles of iron(II) ions, on its own, is worth 2 marks. ie 0.000535 moles of Fe²⁺ on its own. (2 marks)</p> <p>1 mark for calculating the concentration of the iron(II) ions from the candidates number of moles of iron(II) ions. ie $C = n/V$ using candidate's calculated number of moles of iron(II) ions and 0.020. (1 mark)</p>	3	<p>No units required but a maximum of 2 marks can be awarded if an incorrect unit is given.</p> <p>This marking instruction must only be applied a maximum of once per paper.</p> <p>Accept: mol l⁻¹ or mol/l but not mol/l⁻¹ or mol⁻¹ or mol l</p> <p>For method A</p> <p>Candidates should not be penalised if 21.4 and 20 (volumes of permanganate and iron(II) solutions) are both expressed in cm³.</p> <p>If candidate only calculates number of moles of permanganate ions then the volume must be in litres to be awarded 1 mark.</p> <p>If candidate correctly multiplies their calculated number of moles of permanganate ions by 5 the mark for the mole ratio can be awarded.</p> <p>If concentration of incorrect chemical is calculated then max = 1 mark.</p>

Question			Expected response	Max mark	Additional guidance
12.			<p>This is an open-ended question.</p> <p>1 mark: The student has demonstrated a limited understanding of the chemistry involved. The candidate has made some statement(s) that is/are relevant to the situation, showing that at least a little of the chemistry within the context is understood.</p> <p>2 marks: The student has demonstrated a reasonable understanding of the chemistry involved. The student makes some statement(s) that is/are relevant to the situation, showing that the context is understood.</p> <p>3 marks: The maximum available mark would be awarded to a student who has demonstrated a good understanding of the chemistry involved. The student shows a good comprehension of the chemistry of the situation and has provided a logically correct answer to the question posed. This type of response might include a statement of the principles involved, a relationship or an equation, and the application of these to respond to the context. This does not mean the answer has to be what might be termed an “excellent” answer or a “complete” one.</p>	3	

[END OF MARKING INSTRUCTIONS]