

Cambridge International AS & A Level

CHEMISTRY**9701/38**

Paper 3 Advanced Practical Skills 2

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.

This document consists of **20** printed pages.

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: - the specific content defined in the mark scheme - the specific skills defined in the mark scheme or in the level descriptions - 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: - marks are not deducted for errors or omissions - 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 - 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.

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	<u>'List rule' guidance</u> For questions that require <i>n</i> responses (e.g. State two reasons ...): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked <i>ignore</i> in the mark scheme should not count towards <i>n</i>. • Incorrect responses should not be awarded credit but will still count towards <i>n</i>. • 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. • Non-contradictory responses after the first <i>n</i> responses may be ignored even if they include incorrect science.

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.

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
BOD	Benefit of the doubt given
CON	Contradiction in response otherwise markworthy, mark not given
DP	Error in number of decimal places
ECF	Error carried forward applied
I	Incorrect or insufficient point ignored while marking the rest of the response
RE	Rounding error
REP	Repeat error
SEEN or /	Blank page or part of script seen

Annotation	Meaning
SF	Error in number of significant figures
TE	Transcription error

Mark Scheme abbreviations

/	alternative responses for the same marking point
R	reject the response
A	accept the response
I	ignore the response
ecf	error carried forward
AVP	any valid point
ora	or reverse argument
AW	alternative wording
<u>underline</u>	actual word given must be used by candidate (grammatical variants excepted)
()	the word / phrase in brackets is not required but sets the context
max	indicates the maximum number of marks that can be given
M	marking point
ppt	precipitate
sf	significant figures

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Accuracy marks must be recorded on the spreadsheet provided, on an accuracy grid or on a blank part of the Supervisor's script. If using a spreadsheet or accuracy grid, this must be printed and stapled inside the Supervisor script. The relevant Supervisor results must be written and ringed on **each candidate script**.

When awarding the accuracy (Q) mark in **Question 1**, record:

- candidate number
- candidate titre
- difference from supervisor, δ
- mark awarded
- any adjustment (spread adjustment (SA), 50-adjustment (50-A) or rough titration adjustment (RTA))

When awarding accuracy marks in **Question 2** record:

- candidate mass of **FB 6**
- candidate mass loss
- mark awarded

In either question, where more than half the candidates score no marks against the supervisor value, **please contact your team leader (TL)**.

Reject either a rounding error (RE) or a transcription error (TE) only once in the paper. Note: Reject REs only in 'correctly calculates'.
Reject fractions in place of decimal answers only once in the paper.

Practical issues at a centre sometimes mean that candidates cannot access all of the marks. In such cases, contact your TL. Candidate marks may need to be scaled.

Restarts: In calculations sections of quantitative analysis questions, candidates may gain credit in a question part by using either a previous incorrect answer **or** they may 'restart' the calculation using their experimental data correctly. Annotate either 'ecf' or 'allow: restart'.

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Question	Answer	Marks	Guidance
1(a)	I The following data are recorded: - two burette readings and titre for the rough titration - initial and final burette readings for two (or more) accurate titrations	1	Headings and units are not required for this mark. Must be red pen on page 2. A Rough titration readings may be <u>labelled</u> in the accurate table. I errors in values for rough titration, e.g. an initial reading of 50, incorrect subtractions, etc.
	II Titre values recorded for accurate titrations and correct headings and units in a single accurate titration table - initial/start and (burette) reading/volume - final/end and (burette) reading/volume - titre or volume used/added or FB 1 used/added - unit: / cm³ or (cm³) or in cm³ (for each heading) or cm³ unit given for each volume recorded.	1	A 'vol' or 'V' or 'value' for 'reading / volume'. R if initial and final burette readings do not match the data (A 50 as initial volume). R 'difference' or 'amount' or 'change' or 'titrate' (for titre). R ml / cc. I 'total' (titre). I Headings relating to solution turning yellow.
	III All accurate burette readings recorded to 0.05 cm ³	1	R if: 50(.00) is used as an initial burette reading - More than one final burette reading is 50(.00) - Any burette reading is greater than 50(.00). The requirement to record to 0.05 applies to burette readings, including 0.00 cm ³ (if this was the initial reading), but it does not apply to the titre .
	IV The final accurate titre recorded must be within 0.10 cm ³ of any other accurate titre	1	R if these two titres are derived from any burette readings recorded as integers (apart from initial 0 cm ³) R if titre values not calculated but A BOD if all initial burette readings are 0(.00). I any reading labelled rough.

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Question	Answer	Marks	Guidance
1(a)	Accuracy (Q) marks Round burette readings to the nearest 0.05 cm^3. Check and correct titre subtractions where necessary. Examiner selects the best mean titre, using the following hierarchy: • two (or more) accurate identical titres (ignoring any that are labelled 'rough'), <i>then</i> • two (or more) accurate titres within 0.05 cm^3, <i>then</i> • two (or more) accurate titres within 0.10 cm^3, <i>etc</i> Calculate the difference (δ) between the candidate's mean titre and the supervisor's mean titre. Write and ring supervisor's value next to the accurate titration table for each candidate. Also write the candidate's mean value (calculated by examiner) and difference between supervisor's and candidate's value, δ.		

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Question	Answer	Marks	Guidance
1(a)	Award accuracy Q marks as follows:		A spread adjustment (SA) is required if titres selected (by examiner) differ $\geq 1.00 \text{ cm}^3$. A 50-adjustment (50-A) is required if 50.(00) is used as initial volume. Use mean of final volume or actual titre (whichever gives the better Q score). A rough titration adjustment (RTA) is required if only a rough titration was carried out. Use the rough titre to award Q marks. If an adjustment is required: V Award if $\delta \leq 0.30 \text{ cm}^3$ VI Award if $\delta \leq 0.20 \text{ cm}^3$ VII Not available.
	V Award if $\delta \leq 0.50 \text{ cm}^3$	1	
	VI Award if $\delta \leq 0.30 \text{ cm}^3$	1	If only one accurate titration was carried out, use it to award Q marks as normal. A (BOD) accuracy marks from titre values with no readings shown.
	VII Award if $\delta \leq 0.20 \text{ cm}^3$	1	For Supervisor's mean titre $\geq 50.00 \text{ cm}^3$: 3 marks: 0.30, 2 marks: 0.50, 1 mark: 0.80 cm^3 For Supervisor's mean titre $\leq 10.00 \text{ cm}^3$: 3 marks: 0.10, 2 marks: 0.15, 1 mark: 0.25 cm^3 For Supervisor's mean titre $\leq 5.00 \text{ cm}^3$: 3 marks not available, 2 marks: 0.05, 1 mark: 0.10 cm^3 Adjustments apply as above.

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Question	Answer	Marks	Guidance
1(b)	Correctly calculates mean titre • Candidate must take the average of two (or more) titres that are within a total spread of not more than 0.20 cm³. • Working/explanation must be shown or ticks must be put next to the two (or more) accurate readings selected. • The mean should be quoted to 2 dp and be rounded to nearest 0.01 cm³. (e.g. 26.675 cm³ must be rounded to 26.68 cm³)	1	A mean expressed to 1 dp, if all accurate burette readings were given to 1 dp or a mix of 1 dp and integers and the mean is exactly correct. e.g. if titres are 26.0 and 26.2: mean = 26.1 is correct e.g. if titres are 26.0 and 26.1: mean = 26.1 is wrong (should be 26.05 cm³) A ecf if in (a) no readings but only titre values given or no titre calculated and initial reading is 0.(00) cm³. R this mark if: • The rough titre was used to calculate the mean. • The candidate did only one accurate titration. • Burette readings were incorrectly subtracted to obtain any of the accurate titre values. • All burette readings used to calculate the mean were recorded as integers.
1(c)(i)	All answers given to parts (ii), (iii) and (iv) recorded to 3 or 4 sf .	1	Answers must be given for all three question parts. If no value on the answer line, accept final calculated value in the working. Some relevant working is required for at least one question part.
1(c)(ii)	M1 Correctly displays $M_r = (39.1 + 126.9 + 3 \times 16) = 214$	1	A number string. R either 39 or 127.
	M2 Correctly uses amount of $\text{IO}_3^- = \frac{3.35}{214} \times \frac{25}{1000} = 3.91(4) \times 10^{-4}$	1	A ecf from incorrect M_r. A $3.91(4) \times 10^{-4}$ with no working seen for M2. R M2 if no M_r used in calculation. R M2 Rounding to 1 or 2 sf shown during a 2-part calculation (not correct use).
1(c)(iii)	Correctly uses amount of $\text{S}_2\text{O}_3^{2-} = 6 \times \mathbf{1(c)(ii)}$	1	No working required if answer to 3 sf or more.

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Question	Answer	Marks	Guidance
1(c)(iv)	Correctly uses Concentration = $\frac{1(c)(iii) \times 1000}{1(b)}$	1	No working required if answer to 3 sf or more.

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Question	Answer	Marks	Guidance
2(a)(i)	I Unambiguous headings and correctly displayed units in the space provided (Mass of) crucible (+ lid) (Mass of) crucible (+ lid) + FB 6 (or contents before heating) (Mass of) crucible (+ lid) + residue / MX₂ (anhydrous) metal salt/ anhydrous FB 6 / contents (after heating / after cooling) (Mass of) FB 6 (Mass of) residue / MX₂ (anhydrous) metal salt / anhydrous FB 6 contents (after heating / after cooling) (Mass) loss / lost / change in mass / mass of water And Units must be '/' or 'in' or '()' AND g or 'grams' in column headings or with every entry	1	Use of lid must be consistent. There must be something in the crucible after heating. Mass before and after heating must be unambiguous If multiple data sets provided, use first set. R weight for mass. R gram, gr, / (g), (/g). R starting/initial mass; ending/final mass only. R 'FB 6' alone after heating. R incorrect display of units unless R in 1(a). A balance readings to 4 dp. A 1 dp readings if the supervisor report states '1 dp balance only'. R if heated more than once. I heating to 1 min.
	II Three required weighings recorded in the space provided and all weighings recorded to the same number of decimal places (2 or 3);	1	A trailing zeros to be missing from calculated masses. A M3 from figures alongside method but do not look ahead to calculations. If candidate has heated more than once they should use the greatest mass loss. R if mass lost and mass of residue are transposed.
	III Correct subtractions to give masses of FB 6, residue and mass loss and values are correctly labelled	1	If candidate has heated more than once use the greatest mass loss. Write CMR and ringed SMR on each script. If default value is required use Default value for $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ = 6.79. Default value for $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ = 4.09. This must be discussed with TL.

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Question	Answer	Marks	Guidance
2(a)(i)	IV Accuracy (Q) mark Calculate candidate's mass ratio (CMR) (to 2 dp) $= \frac{\text{mass FB 6}}{\text{mass lost}}$ Calculate supervisor's mass ratio (SMR) (to 2 dp) $= \frac{\text{mass FB 6}}{\text{mass lost}}$ Award IV if the candidate mass ratio is within 7% of the supervisor mass ratio i.e., CMR range = 0.93 SMR to 1.07 SMR	1	
2(a)(ii)	Anion test M1 (Add) water to dissolve the residue / add water to make a solution	1	A use of nitric acid for water. A testing FB 6. R use of sulfuric or hydrochloric acid to make solution (M1 and M2). I 'residue' (aq) an alternative to dissolving.
	M2 (use of) silver nitrate / AgNO_3 and white precipitate (observed)	1	I Ag^+ for AgNO_3, but ecf to M3. I addition of nitric acid. R M2 if any other reagents used, but I KMnO_4. R if ppt is soluble in silver nitrate / excess.
	M3 (use of) ammonia / NH_3 and correct conclusion = Cl^- / chloride	1	M3 is dependent attempt at M2. R Br^- / bromide (no ecf). R Cl_2. I Cl. I observation with ammonia / NH_3.
2(b)(i)	correctly calculates $n(\text{H}_2\text{O})$ $n(\text{H}_2\text{O}) = \frac{\text{mass loss}}{18}$ and answer given to 2 – 4 sf	1	A Mass loss derived from either the weighings or from the masses of FB 6 and residue. If candidate has confused mass of residue with mass loss in (a), mark ecf. A Re-start. A no working if answer to 3 – 4 sf. R incorrect sf once only within 2(b).

Question	Answer	Marks	Guidance														
2(b)(ii)	Correct use of (b)(i) to find M_r of MX_2 $M_r = [(\text{mass of residue} \times 2) / 2(b)(i)]$ and answer given to 2 – 4 sf	1	A $M_r = [(\text{mass of residue}) / ((b)(i) \div 2)]$ A $M_r = [(\text{mass of FB 6}) / ((b)(i) \div 2)] - 36$ If candidate has confused mass of residue with mass loss in (a), mark ecf. A Re-start. A no working if answer to 3 – 4 sf.														
2(b)(iii)	$A_r = 2(b)(ii) - 2 \times$ correct A_r of halide ion in 2(a)(ii) and answer given to 2 – 4 sf and M = correct choice of Group 2 metal and cation has 2+ charge	1	put dot on A_r if correct. ecf from incorrect halide in 2(a)(ii). A ecf from non-halide X^- ion in 2(a)(ii). A A_r in working. A absence of display of the decimal in any A_r (e.g. 80 for 79.9) if already R in 1(c)(ii). A name of Group 2 metal (with / without charge). R if no use of (a)(ii) and (b)(ii). R if (b)(ii) not derived from experimental results. If ecf results in a negative A_r A with 'not possible to identify M^{2+} or Be^{2+}'. <table><tr><th>A_r</th><th>M</th></tr><tr><td>< 16.7</td><td>Be</td></tr><tr><td>$16.7 \leq A_r < 32.2$</td><td>Mg</td></tr><tr><td>$32.2 \leq A_r < 63.9$</td><td>Ca</td></tr><tr><td>$63.9 \leq A_r < 112.5$</td><td>Sr</td></tr><tr><td>$112.5 \leq A_r < 250$</td><td>Ba</td></tr><tr><td>> 250</td><td>Ra</td></tr></table>	A_r	M	< 16.7	Be	$16.7 \leq A_r < 32.2$	Mg	$32.2 \leq A_r < 63.9$	Ca	$63.9 \leq A_r < 112.5$	Sr	$112.5 \leq A_r < 250$	Ba	> 250	Ra
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Question	Answer	Marks	Guidance																								
2(c)(i)	Correct expression $\frac{ (\text{Actual } M_r \text{MX}_2 - \mathbf{2(b)(ii)}) }{\text{Actual } M_r \text{MX}_2} \times 100$	1	A ecf from whole number A_r (e.g. 24 for Mg, 80 for Br) in 2(b)(iii). A Expression with $(\text{Actual } M_r \text{MX}_2 - \mathbf{2(b)(ii)})$ evaluated (and rest of expression correct). A correct number strings for actual MX_2. A any valid mathematical method to calculate percentage error. R if (b)(ii) not derived from experiment results. I answer but A to confirm missing $\times 100$. A ecf for any formula identified in 2(b)(ii) from table. <table border="1"> <thead> <tr> <th>M</th><th>$M_r(\text{MCl}_2)$</th><th>$M_r(\text{MBr}_2)$</th><th>$M_r(\text{MI}_2)$</th></tr> </thead> <tbody> <tr> <td>Be</td><td>80</td><td>168.8</td><td>262.8</td></tr> <tr> <td>Mg</td><td>95.3</td><td>184.1</td><td>278.1</td></tr> <tr> <td>Ca</td><td>111.1</td><td>199.9</td><td>293.9</td></tr> <tr> <td>Sr</td><td>158.6</td><td>247.4</td><td>341.4</td></tr> <tr> <td><u>Ba</u></td><td>208.3</td><td>297.1</td><td>391.1</td></tr> </tbody> </table>	M	$M_r(\text{MCl}_2)$	$M_r(\text{MBr}_2)$	$M_r(\text{MI}_2)$	Be	80	168.8	262.8	Mg	95.3	184.1	278.1	Ca	111.1	199.9	293.9	Sr	158.6	247.4	341.4	<u>Ba</u>	208.3	297.1	391.1
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2(c)(ii)	Heat to constant mass	1	I use a balance to more dp. I use more mass of FB 6. I heat for longer. I use a desiccator. I Repeat experiment.																								

Question	Answer	Marks	Guidance
FB 7 = KMnO₄ FB 8 = mix of Na₂SO₃ and NH₄C/ FB 9 = H₂SO₄			
3(a)(i)	(FB 7) starting colour (dark) purple - solid jumps/moves around - black residue (gas) relights glowing splint (gas produced is) Oxygen / O₂	2	blob 1 A purple-black. blob 2 A spitting. blob 3 A black solid or black powder for residue if clearly at the end. blob 4 A glowing splint relights with a pop. blob 4 A glowing splint glows more brightly. blob 1 and 3 I form a purple solid. R blobs 4 and 5 if another incorrect positive gas test. R precipitate (CON 1 blob). I vapour / effervescence / black gas / black fumes / black smoke / solid melts / condensation / solid pops / solid crackles. I intermediate colours of solids, e.g. green. 'black solid / powder jumping' = 1 blob. 'purple solid jumping' = 2 blobs. 2 blobs = 1 mark – max 2.
3(a)(ii)	O / Oxygen is oxidised and Mn / Manganese is reduced or O is oxidised to O₂ (gas) or O (is oxidised from) -2 to 0 or Mn is reduced to K₂MnO₄ / MnO₂ or Mn (is reduced) from +7 to +6 / +4	1	A oxidation number increases / loses electrons = oxidised. A oxidation number decreases / gain electrons = reduced. R K oxidised or reduced. R disproportionation. A (bod) O²⁻ (is oxidised) to O / O₂ but R O⁽²⁻⁾ <u>ion</u> / oxide ion (is oxidised). I Manganate / MnO₄⁻ is reduced. R Manganate / MnO₄⁻ is oxidised. I Mn (is reduced) to +3 / +2.

Question	Answer		Marks	Guidance
3(b)(i)	test	observations		5 2 blobs = 1 mark – max 5. R 'No observation' first time seen. R '–' every time seen. Test 1 must describe what is happening to the KMnO_4 (not to the solution to which it is added). Test 1 I black / brown precipitate. Test 1 FB 8 R (solution) remains colourless / colourless solution forms (alone). Test 1 FB 9 R purple / pink solution formed (alone). Test 2 A effervescence for FB 8 if it is clear there is more / greater / faster reaction with FB 9 . R any other positive gas tests (CON blob). FB 8 I test for hydrogen. I Mg dissolves. I solid, residue, particles for ppt first time seen, then A . I cloudy / milky solutions (if ppt also present). Test 3 R soluble in excess every time. Test 3 R addition of acid once, then ecf but R if ppt with FB 9 is soluble. If sulfuric acid, R every time. Test 3 R addition of KMnO_4 once, then ecf. Test 4 with FB 9 A 'no change' initially and (off-)white / cream / pale yellow ppt**. A white solution / milky / cloudy forms slowly*.
		FB 8	FB 9	
	Test 1 + KMnO_4	purple / KMnO_4 and turns colourless / decolourised*	no change or (KMnO_4) remains purple / does not decolourise*	
	Test 2 + Mg	no change*	effervescence* 'Pops' with a lighted splint* exothermic / tube gets warm*	
	Test 3 + Ba^{2+}	white ppt*	white ppt*	
	Test 4 + thiosulfate	no change*	(off-)white / cream / (pale) yellow ppt* forms slowly*	
2* = 1 mark				

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Question	Answer	Marks	Guidance
3(b)(ii)	M1: Use of NaOH and no ppt / no change reported	1	I use of ammonia / KMnO_4 in a separate test. I flame tests. A no ppt anywhere in 3(b)(ii) . A 'no observation' if R in 3(b)(i) . R any other tests.
	M2: warm the mixture	1	A heat. A if ammonia added. R use of aluminium. R if NaOH not added.
	M3: gas/ NH_3 turns (red) litmus blue	1	A if aluminium used I positive hydrogen test. There must be some reference to gas before testing with litmus paper to award M3 . R if NaOH not added. R any other positive gas tests.
3(b)(iii)	M1 Cation = NH_4^+ / ammonium	1	R if 3(b)(ii) not attempted.
	M2 Anions = unknown and SO_3^{2-} / sulfite	1	Anions: A unknown and unknown. A Nitrite and sulfate. R if Tests 1 and 3 in 3(b)(i) not attempted.
3(b)(iv)	H_2SO_4	1	Stand alone mark.
3(b)(v)	$2\text{H}^+(\text{aq}) + \text{Mg}(\text{s}) \rightarrow \text{Mg}^{2+}(\text{aq}) + \text{H}_2(\text{g})$ or $\text{Ba}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{BaSO}_4(\text{s})$ or $\text{S}_2\text{O}_3^{2-}(\text{aq}) + 2\text{H}^+(\text{aq}) \rightarrow \text{S}(\text{s}) + \text{SO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$	1	If H_2SO_3 in 3(b)(iv) A : $\text{Ba}^{2+}(\text{aq}) + \text{SO}_3^{2-}(\text{aq}) \rightarrow \text{BaSO}_3(\text{s})$