



General Certificate of Education

Chemistry

Investigative Skills Assignment

CHM6T/Q11/MG

Final

Marking Guidelines

2011 examination – June series

Marking Guidelines are prepared by the Principal Moderator and considered, together with the relevant questions, by a panel of subject teachers.

It must be stressed that Marking Guidelines are a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future Marking Guidelines on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Guidance for teachers marking Chemistry ISAs

Final Marking Guidelines must be used to mark candidates' work.

General principles

In general, you are looking for evidence that the candidate knows and understands the key idea required by the Marking Guidelines.

It is important to mark what the candidate has written, not to assume what may have been intended. It is also important to make sure that a valid point is in the correct context. Individual words or phrases where the overall answer does not apply to the question asked should not be credited.

Conventions

The following conventions are used in the Marking Guidelines.

- An oblique stroke (/) separates alternatives within a marking point.
- Underlining of a word or phrase means that the term must be used.
- Brackets are used to indicate contexts for which a marking point is valid. This context may be implied by a candidate's answer.
- 'Accept' shows answers that have been allowed.
- 'Max' refers to the maximum mark that can be awarded for a particular question.

The Marking Guidelines show the minimum acceptable answer(s) for each marking point. A better, more detailed, or more advanced answer should always be accepted, provided that it covers the same key ideas.

Marking Guidelines cannot give every possible alternative wording - equivalent phrasing of answers should be accepted. It is, however, important to be sure that the minimum requirement of the guidelines is met and that the point is made unambiguously.

Converse answers are normally acceptable, unless the wording of the question rules this out. For example, 'an increase in pressure favours the forward reaction' or 'a decrease in pressure favours the backward reaction'.

Occasionally, a candidate will give a chemically correct answer that is not present in the Marking Guidelines. If it is equivalent in standard to the Marking Guideline answers, it should be credited. In this case, write the word 'valid'.

All marking points are awarded independently, unless a link between points is specified in the Marking Guidelines.

The mechanics of marking

Always mark in red ink. Make sure that some red ink appears on every page on which the candidate has written.

For each mark awarded, put a tick close to the word or phrase. In all cases, a tick should equal one mark and the total number of ticks should match the mark given for that question. The teacher should write the total mark in the margin.

Put a cross against incorrect points. It is helpful to indicate omissions of key words or incomplete answers with a **Λ** symbol, and to highlight irrelevancies or contradictions etc. by underlining. It may also be helpful to write brief comments to explain the reason for awarding or withholding a mark when the answer does not obviously match the Marking Guidelines.

When marking answers with many marking points, the points do not have to appear in the order in the Marking Guidelines.

Disqualifiers A correct point should be disqualified when the candidate contradicts it in the same answer. Indicate by 'dq'. If a tick has already been placed against a valid point, ensure that it is clearly deleted. Note that there is no penalty for incorrect points which are not contradictory, nor for surplus or neutral information.

The list rule When a question asks for a specific number of points, and the candidate gives more, the general rule is that any wrong answer cancels a correct answer. For example, if a question asks for two points and three answers are given, two correct and one clearly wrong, the mark awarded is one, whatever the order of the answers. This prevents candidates from gaining full marks from a list of right and wrong answers.

'Neutral' points, i.e. ones which are not creditworthy but not actually incorrect, should not negate a correct answer. For example, in answer to 'Name **two** physical properties of metals' a candidate may give:

'Good conductor of electricity, solid, high density'.

In this case one mark would be awarded for 'good conductor of electricity' and one for 'high density'. 'Solid' is a neutral point and should be ignored.

Two correct points on the same answer line should be credited.

Spelling Reasonably close phonetic spellings should be credited.

Task Assessment

Q	Marking Guidelines	Mark	Additional Guidance
	Results of Part 2 are recorded clearly and in full in a sensible table	(R) 1	If you can read it, it is clear. 'Full' means all required sections complete. Allow a table without gridlines.
	The appearance of the <i>Prussian Blue</i> sample – should be even-coloured	(A) 1	
	Yield to be assessed by observation <ul style="list-style-type: none"> - some sample in filter paper – similar to teacher - significantly less sample than teacher 	(Y) 2 1	Must be less than half of teacher's amount. Only gets zero if no sample produced.
	The accuracy of the observations measured against teacher observations (9 possible) <ul style="list-style-type: none"> 8–9 correct scores 4 marks 6–7 correct scores 3 marks 3–5 correct scores 2 marks 1–2 correct scores 1 mark 	(O) 4 3 2 1	Mark to the grid on page 6. If the teacher results differ from the published grid, consult your Assessment Adviser for guidance. If answers contradict eg 'no visible change with effervescence' then scoring point is not awarded. Look for the basic colour; ignore additional shades if the answer is unambiguous, except in Test 3. Accept 'no change', 'no reaction', 'stays the same' as well as 'no visible change'. Accept 'bubbles (of gas)', 'fizzes' or 'colourless gas formed' as well as 'effervescence'. Do not accept 'clear' instead of 'colourless'.
	Total	8	

	Iron(II) sulfate solution	Iron(III) nitrate solution
Test 1 NaOH(aq)	green <u>ppt.</u> (1) darkens on standing/goes brown (1)	red-brown/orange-brown <u>ppt.</u> (not red) (1) no further change (1)
Test 2 Na ₂ CO ₃ (aq)	green <u>ppt.</u> (1)	orange-brown <u>ppt.</u> (1) gas evolved/effervescence/fizzing (1)
Test 3 K ₄ Fe(CN) ₆ (aq)	white/pale blue <u>ppt.</u> (1)	dark blue <u>ppt.</u> (1)

Section A Ignore absence of units unless units are required in the Marking Guidelines. Incorrect units lose the mark

Q	Part	Marking Guidelines	Mark	Additional Guidance
1		306.7	1	Must give answer to 1 d.p.
2		$(1.65/306.7) = 5.38 \times 10^{-3}$	1	Answer must be given to at least 2 s.f. eg allow 5.4×10^{-3} but not 5×10^{-3} Mark consequentially to answer in Q1.
3		$(10/1000) \times 0.75 = 7.5 \times 10^{-3}$ (mol of $K_4[Fe(CN)_6]$) Same number of moles of <i>Prussian Blue</i> OR $((10/1000) \times 0.75)$	1 1	Allow both marks for 7.5×10^{-3} mol but must show working.
4		71.7%	1	Do not penalise precision. Allow answer to $(Q2/Q3) \times 100$
5		Wash with water (and filter)	1	
6		$FeCO_3$	1	Allow $Fe(OH)_2 \cdot FeCO_3$
		$Fe(H_2O)_3(OH)_3$	1	Allow $Fe(OH)_3$ or $Fe(OH)_3 \cdot xH_2O$
7		$[Fe(H_2O)_6]^{3+} + 3OH^- \rightarrow Fe(H_2O)_3(OH)_3 + 3H_2O$	1	Ignore state symbols unless incorrect.
		Total	9	

Section B Ignore absence of units unless units are required in the Marking Guidelines. Incorrect units lose the mark

Q	Part	Marking Guidelines	Mark	Additional Guidance
8		(ligand) substitution	1	Allow 'ligand exchange'.
9		To displace the <u>equilibrium</u> to the right To improve the yield	1 1	To ensure reaction goes to completion. Allow 'to replace all chlorines'.
10	a	$K_2PtCl_4 + 4KI \rightarrow K_2PtI_4 + 4KCl$	1	Allow correct ionic equations $PtCl_4^{2-} + 4I^- \rightarrow PtI_4^{2-} + 4Cl^-$ Allow multiples and fractions.
10	b	$= (780.9) \times 100 / (415.3 + 664)$ $= 72.4$	1	Working must be clearly shown. Allow one mark for correct relationship even if M_r values are incorrect eg using values from ionic equation. Allow 72%
11	a	$Ag^+ + I^- \rightarrow AgI$	1	Ignore state symbols even if incorrect. This equation only.
11	b	Stops the reverse reaction/equilibrium displaced to the right	1	
12		Number of steps in the process Losses at each stage of the synthesis	1 1	Allow 'equilibrium may lie on the reactant side'/side reactions/isomer formation. Equilibrium losses or practical losses or yield not 100% for each step.
13		Minimum amount of hot solvent Cool/crystallise Filter	1 1 1	Accept 'small' for minimum. Accept water.

Q	Part	Marking Guidelines	Mark	Additional Guidance
14	a	Small amounts are more likely to kill cancer cells rather than the patient	1	
14	b	Wear gloves/wash hands after use	1	Ignore masks. Apply the list principle if more than one answer.
15	a	$\text{EDTA}^{4-} + [\text{Cu}(\text{H}_2\text{O})_6]^{2+} \rightarrow [\text{Cu}(\text{EDTA})]^{2-} + 6\text{H}_2\text{O}$	1	
15	b	(Mol EDTA = $(\frac{6.45}{1000}) \times 0.015 = 9.68 \times 10^{-5}$ mol Cu(II) Conc. Cu(II) = $(9.68 \times 10^{-5})/0.025 = 0.00387$ mol dm ⁻³)	1	Correct answer without working gains M2 only.
16		Samples may not be consistent throughout the river OR Concentration may vary over time	1	Ignore comments on technique.
17		$[\text{Ag}(\text{NH}_3)_2]^+$ aldehyde	1	Accept name eg diamminesilver(I) ion.
		Total	21	Allow CHO.