



General Certificate of Education

Chemistry

Investigative Skills Assignment

CHM3T/Q10/MG

Marking Guidelines

2010 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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Set and published by the Assessment and Qualifications Alliance.

Guidance for teachers marking Chemistry ISAs

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 Δ 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	Part	Marking Guidelines	Mark	Additional Guidance
		Results recorded clearly and in full	(R)1	If you can read it, it is clear. 'Full' means completes at least 15 boxes.
		In an appropriate table	(R)1	Results are laid out comprehensibly.
		The accuracy of the observations measured against teacher observations 15–16 correct–6 marks 13–14 correct–5 marks 10–12 correct–4 marks 7–9 correct–3 marks 4–6 correct–2 marks 1–3 correct–1 mark	(A)6	Check the teacher observations against the specimen grid, noting significant discrepancies. Keep these discrepancies in mind when marking the scripts; allow either the published answer or the teacher alternative. If answers contradict e.g. 'No visible change with white precipitate' then scoring point is not awarded. Look for the basic colour; ignore additional shades if the answer is unambiguous. Clear is not the same as white/colourless. Accept 'sediment' and 'solid deposit' as well as 'precipitate'. If 'crystals' or 'crystalline substance' used consistently instead of 'precipitate' mark as correct but deduct 1 mark from the final total. Do not accept 'cloudy' or 'misty' or 'emulsion' or 'suspension'. Accept 'no change', 'no reaction', 'stays the same' as well as 'no visible change'. Do not accept 'nothing' or 'none'. If 'precipitate' or a variation is missing in the answer, penalise each omission. If 'solution' missing in the answer, penalise once.
		Total	8	

Expected Observations

	P	Q	R	A
AgNO₃	Yellow ppt.	White ppt.	Cream/white ppt.	Cream/white ppt.
Dil. NH₃	No visible change	Ppt. dissolves	No visible change or ppt. dissolves slightly	No visible change or ppt. dissolves slightly
Conc. NH₃	Ppt. turns white or No visible change	No visible change	No visible change or ppt. dissolves slightly	No visible change or ppt. dissolves slightly
Dil. HNO₃	Yellow ppt. returns or No visible change	White ppt.	Cream/white ppt.	White/cream ppt.

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		P – Iodide; Q – Chloride; R – Bromide (3 correct – 2 marks; 1 correct – 1 mark)	2	Allow ion formulae (if correct). Do not allow halogen in place of halide.
2		Chloride and Bromide	1	Both are needed. Penalise if elements given unless already penalised above.
3		$I^{-}(aq) + Ag^{+}(aq) \rightarrow AgI(s)$	1	Allow consequential answer on Q1 Allow $I^{-}(aq) + AgNO_3(aq) \rightarrow AgI(s) + NO_3^{-}(aq)$ Allow multiples. Lose mark if state symbols missing or incorrect.
4		Neutralisation	1	Accept 'acid-base'. Do not accept 'acid' or 'base' singly. Ignore any reference to Bronsted-Lowry or Lewis.
5		AgCl or silver chloride	1	Consequential on Q1
6		No visible change	1	Accept 'no change', 'no reaction', 'stays the same' as well as 'no visible change'. Do not accept 'nothing' or 'none'.
7		Reagent is expensive/toxic/requires safe disposal/hazardous to eyes	1	Do not allow unspecified hazard e.g. 'dangerous'.
		Total	8	

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		Correct completion of table (7.2 – 9.4 – 10.3 – 11.5 – 12.2 – 13.1) Appropriate scales for axes All points plotted correctly Line of best fit acceptable	1 1 1 1	Any error loses the mark. No penalty for missing labels but the graph must cover at least half of the available area. Allow ± 1 small square. Must be a reasonably smooth curve but make allowance for freehand drawing passing within one small square of each point. Do not penalise minor doubling of line.
9		Maximum mass at (44.0/4) = 11.0 g giving a max. pressure of 1.7 ± 0.1 MPa	1	Allow this pressure range only. Check that candidate's answer matches graph.
10		7.2 g of NaCl in 250 cm ³ represents 28.8 g dm ⁻³ Molarity = 0.492 mol dm ⁻³	1 1	Allow 0.49 but not 0.5; otherwise do not penalise precision of answer Conseq. to their graph value for 100 kPa to 2 or 3 sig.
11		Measuring cylinder = $(1/250) \times 100 = 0.4\%$ Balance = $(0.1/7.2) \times 100 = 1.4\%$ Combined error 1.8%	1 1	Both values correct for the first mark. Balance error conseq. on their 100 kPa mass value. Ignore precision of answers. When error being calculated is not stated, allow if the calculations are in the same order as in the question (measuring cylinder, balance). If only combined error given then 1 mark only.
12	a	The points are good enough to be able to draw a smooth curve because the line passes through/close to all points.	1	Mark consequentially on candidate's graph
12	b	There are no anomalous points	1	Mark consequentially on candidate's graph

Q	Part	Marking Guidelines	Mark	Additional Guidance
13		The experiment only seeks an approximate figure for the maximum pressure	1	Allow words to that effect.
14	a	Toxic (to marine life)	1	Allow phrasing which implies a detrimental effect on marine ecology.
14	b	Mixing the effluent with (sea) water to dilute it	1	Penalise any method which removes the salt or which implies storage.
15		$2\text{Br}^- + \text{Cl}_2 \rightarrow 2\text{Cl}^- + \text{Br}_2$	1	Allow NaBr or KBr
16		The cost of removing water/heating would be too high	1	Discount answers based on toxicity or speed of reaction. Allow answers based on cost of using sulfuric acid.
17	a	Carbon	1	Allow C, soot, graphite, coal.
17	b	Formed by the decomposition of organic material/living organisms in the sea water	1	Allow 'erosion of coal beds'.
17	c	Dissolve the solid formed in water Filter off the insoluble particles	1 1	Do not allow melting of the solid.
18		$\text{Ca}(\text{OH})_2 + 2\text{HCl} \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O}$	1	Allow $\text{Ca}(\text{OH})_2 + 2\text{H}^+ \rightarrow \text{Ca}^{2+} + 2\text{H}_2\text{O}$ Allow multiples.
19		In agriculture/to raise the pH of soil/ (Lime-based) mortars in construction	1	Allow words to that effect.
		Total	22	