AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Chemistry

Investigative Skills Assignment

CHM3T/Q09/mark

Marking Guidelines

2009 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.

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.

- A semicolon (;) separates each marking point
- 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' and 'reject' show answers which should be allowed or not allowed.
- Additional instructions are shown in *italics*
- '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 mark point. A better, more detailed, or more advanced answers 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 key word or phrase. In all cases a tick should equal one mark and the total number of ticks should match the totals in the margins.

Put a cross against incorrect points. It is helpful to indicate omissions of key words or incomplete answers with a **?** symbol, and to highlight irrelevancies, 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 will be numbered. The points do not have to appear in the order in the marking guidelines. The appropriate number must be placed alongside the tick. This helps to clarify where a specific point has been awarded and again makes moderation much easier. It also helps to avoid awarding the same point twice.

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, if in answer to 'Name **two** physical properties of metals' a candidate gives:
'High melting point, good conductor of electricity, good conductor of heat', 1 mark would be awarded.
Two correct points on the same answer line should be credited.

Spelling Reasonably close phonetic spellings should be credited.

TASK ASSESSMENT

The following skills are assessed from the **Candidate Results Sheet**:

(a)	the **recording** of results
	candidate records initial temperature of the acid
	other results recorded clearly and in full in a table
	Notes: *if you can read it, it is clear*
	        full means completes the temperature row correctly,
	         with no entry for the 4th minute
	        table does not have to have gridlines
	        allow clear answer outside of a table box
		(R)	**1**
			1

(b)	the awareness of **precision** candidate records **all** temperatures to 1 dp **Notes:** *this includes the original temperature of the acid on* *the Candidate Results Sheet*	**(P)**	**1**

(c)	the **accuracy** of the temperature rise, measured against a target value
	
	temperature rise is within 3% of teacher value 5 marks
	temperature rise is within 5% of teacher value 4 marks
	temperature rise is within 8% of teacher value 3 marks
	temperature rise is within 10% of teacher value 2 marks
	temperature rise is within 12% of teacher value 1 mark
	Notes: *it is essential that the teacher checks that the*
	      candidate's value for the temperature rise is
	      determined correctly from the candidate's graph.
	      The teacher must check that the candidate's answers
	      to questions 2, 3, 4 and 5 in Section A of the ISA are
	      *correct **before** allocating marks for accuracy.*
	     if the candidate's answer to question 2 or 3 or 4 or
	      5 in Section A of the ISA is wrong, underline the
	      wrong value and write the correct value by the side.
	     *use the **corrected** value for the temperature rise to*
	      assess accuracy
		(A)	**5**

			Total 8

Enter your mark for recording (R), precision (P) and accuracy (A) in the table at the bottom of each Candidate Results Sheet.

SECTION A

Question 1

temperature on *y*-axis   1
>   **Notes**   * *If axes unlabelled use data to decide if temperature is on the
>   y-axis*

sensible scales   1
>   **Notes**   * *lose this mark if the **plotted points** do not cover at least half of the
>   paper*
>   * *lose this mark if the graph plot goes off the squared paper*
>   * *lose this mark if the temp axis starts at 0 °C*

plots points correctly ± one square   1

draws two best fit straight lines   1
>   **Notes**   * *candidate must draw **two** correct lines to the 4th minute*

both extrapolations correct   1
>   **Notes**   * *award this mark if the candidate's extrapolation is close to your
>   extrapolation*

Question 2

correct value for temperature before mixing from graph   1
>   **Notes**   * *ignore precision of answer*

Question 3

calculates correctly the average temperature before mixing   1
>   **Notes**   * *ignore precision of answer*

Question 4

correct value for temperature after mixing from graph   1
>   **Notes**   * *ignore precision of answer*

Question 5

correct value for temperature rise from graph   1
>   **Notes**   * *only award this mark if ΔT recorded to **1 dp***

Question 6

uses mcΔT equation   1
correct result using own value from question 5 $50 \times 4.18 \times \Delta T$ 1
   Notes   * *do not penalise missing units, but if units are given they must be correct*
           * *do not award the first mark if no working shown*

Question 7

5×10^{-2} mol   1
   Notes   * *ignore precision of answer*

Question 8

answer from question 6 divided by answer from question 7   1
   Notes   * ***must** divide answer to q6 by answer to q7 to score this mark*
           * *ignore sign of enthalpy change*

Question 9

calculates error in rise in temperature correctly   1
   Notes   * ***must** calculate 0.2×100 divided by answer from q5 correctly to score this mark*

Question 10

hazard   acid or alkali corrosive/ irritant/ toxic   1
precaution   eye protection/ gloves
   Notes   * *need hazard **and** sensible precaution to score mark*
           * *only mark first answer to precaution*

Question 11

appropriate comment on outcome from graph such as   1
lines of best fit good/ poor **or**
technique good/ poor **or**
results consistent/ reliable **or** inconsistent/ unreliable
   Notes   * *must make a clear written comment to score this mark*
           * *comment must correlate with candidate's graph*

can/ can't extrapolate with confidence   1
   Notes   * *must make a clear written comment to score this mark*
           * *comment must correlate with candidate's graph*

Question 12

correctly calculates difference between 58.2 and answer from question 8   1
    Notes   * *difference must be clearly stated*
               * *ignore precision of answer*
               * *using 50.1 gives a difference of 8.1*

difference divided by 58.2×100 1
    Notes   * *ignore precision of answer*
               * *do **not** award this mark if the candidate uses a different method*
               * *using 50.1 gives 13.9% error*

Question 13

appreciates heat loss main source of error   1

appropriate improvement to reduce heat loss   eg more lagging/ lid   1
    Notes   * *do not allow 'better calorimeter' without further qualification*
               * *do not allow bomb calorimeter or food calorimeter*

Question 14

improve reliability of results/ appreciates repeating allows for possible   1
anomalies in single experiment
    Notes   * *do not allow 'fair test' without further qualification*

Question 15

not corrosive / easier to handle / an excess is unlikely to create hazard/   1
insoluble so no effect on pH of solution/ 1 mol reacts with 2 mol of HCl

Question 16

appreciates 485 mol $CaCO_3$ needed   1
mass needed is 485×100.1 divided by $1000 = 48.5(4)$ kg   1
    Notes   * *award mark if final answer recorded as an integer,*
             1 dp or 2 dp only

                                               Total 25

SECTION B

Question 17

sulfuric acid/ H_2SO_4 1

Question 18

hydriodic acid/ HI   **OR**   hydrobromic acid/HBr   1

Question 19

add **dilute** ammonia solution   1
    Notes   * *do not allow 'concentrated ammonia' or 'ammonia'*

precipitate / ppt   disappears / dissolves   **OR** colourless solution forms   1

Question 20

would react with the acid/ no gas evolved in tests   1

Total 5