



CHEMISTRY

9791/04

Paper 4 Practical

May/June 2019

MARK SCHEME

Maximum Mark: 40

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

PUBLISHED**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Mark
1(a)	<p>I Records clearly the mass of weighing bottle + FA 1, mass of weighing bottle (+ residue), and mass of FA 1. All entries with correct units (1)</p> <p>II Tabulates initial burette readings, final burette readings and volume of FA 2 added. (1)</p> <p>III Appropriate headings and units for titration results; in cm^3 or (cm^3) or / cm^3 (1)</p> <p>IV All accurate burette readings and the volumes of FA 2 added are given to the nearest 0.05 cm^3 (1)</p> <p>V Two or more uncorrected titres within 0.20 cm^3 (1)</p> <p>VI, VII, VIII Examiner calculates the percentage by mass using corrected candidate values and compares to the supervisor value. $\delta = \text{supervisor percentage} - \text{corrected candidate percentage}$ Award VI, VII and VIII if $\delta \leq 0.20$ Award VI and VII only if $0.20 < \delta \leq 0.40$ Award VI only if $0.40 \leq \delta \leq 0.60$ (3)</p>	8
1(b)	Selects titres within 0.20 cm^3 , calculates the correct mean and gives answer to the same number of decimal places as the most precise burette reading.	1
1(c)(i)	Shows correct working: (b) / 1000 \times 0.0400 (1) Correctly calculates: $250 / 25 \times \text{correct ans}$ (1)	2
1(c)(ii)	Shows correct working: moles of HCl added = $(250 / 1000) \times 0.100 = 0.025$ (1) moles of $\text{K}_2\text{CO}_3 = (0.025 - \text{(c)(i)}) / 2$ (1)	2
1(c)(iii)	Correctly calculates: (c)(ii) \times 138.2 (1) (answer / mass of FA 1) \times 100 (1)	2
1(d)(i)	Any reagent which is soluble and gives a precipitate with carbonate e.g. $\text{Ca}(\text{OH})_2$ (1)	1
1(d)(ii)	Less accurate as hard to judge end point given presence of precipitate (1)	1

Question	Answer	Mark
2(a)	<p>I Unambiguous headings for each entry AND masses in g or / g or (g) (1) minimum 3 recorded masses, mass of residue and mass of water lost</p> <p>II All masses recorded to same dp (1)</p> <p>III Correctly calculates mass of residue and mass of water lost (1)</p> <p>IV Final masses after heating within 0.05 g (1)</p> <p>V Compare corrected mass of FA 5 / corrected mass lost with supervisor ratio to 2 dp. Award if $\delta \leq 0.10$ (1)</p>	5
2(b)(i)	mass lost / mass of FA 5 x100 (min 2 sf)	1
2(b)(ii)	<p>$39 / (32.1 + 64) = 0.406$ AND (b)(i) / 18 = ans (1)</p> <p>$x = \text{ans} / 0.406$ (1)</p>	2
2(b)(iii)	<p>$\% = 100 - 39.0 - \text{(b)(i)} = \text{ans}$ (1) $\text{ans} / 0.406 = A_r M$ (1) M identified as nearest to calc A_r and must be a Group 2 metal (1)</p>	3

Question	Answer	Mark
3(a)	<p>I no reaction with: FA 6 + FA 7 FA 8 + FA 9 (1)</p> <p>II white ppt with: FA 6 + FA 9 FA 7 + FA 9 (1)</p> <p>III red-brown ppt with: FA 6 + FA 8 FA 7 + FA 8 (1)</p> <p>IV solubility of ppt: FA 6 + FA 9 (1)</p> <p>V effervescence with FA 7 + FA 8 (1)</p>	5
3(b)	<p>AgNO₃: brown ppt with FA 6 (allow grey-brown) AND white or brown ppt with FA 7 (allow grey-brown) AND no reaction with FA 8 AND white ppt with FA 9. (1)</p> <p>BaCl₂ / Ba(NO₃)₂ white ppt with only FA 7 and FA 8 (1)</p>	2

Question	Answer	Mark
3(c)	<p>FA 6 contains OH^- (1)</p> <p>FA 7 contains CO_3^{2-} (1)</p> <p>FA 8 contains Fe^{3+} AND SO_4^{2-} (1)</p> <p>FA 9 contains Al^{3+} AND Cl^- OR FA 9 contains Zn^{2+} AND Cl^- (1)</p> <p>FA 8 is acidified OR FA 9 contains Al^{3+} or Zn^{2+} (1)</p>	5