Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

CHEMISTRY **9701/52**

Paper 5 Planning, Analysis and Evaluation **March 2019**

MARK SCHEME

Maximum Mark: 30

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 March 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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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.

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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.

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Question	Answer	Marks
1(a)(i)	**M1** moles needed 0.100 × 250 / 1000 = 0.025(0) mol **M2** M1 × 166.0 = 4.15 g	**2**
1(a)(ii)	(Re)weigh the empty weighing boat (and the difference should be 4.15 g)	**1**
1(a)(iii)	**M1** (pour using a funnel and) rinse the beaker with (distilled) water **M2** add (distilled) water dropwise near the mark	**2**
1(b)	the solution in the burette is at the expected concentration	**1**
1(c)	12.50 (cm^3)	**1**
1(d)(i)	step 4	**1**
1(d)(ii)	the recorded times are repeatable / the recorded times can be duplicated / the repeated times are close to one another	**1**
1(d)(iii)	0.5(00)%	**1**
1(d)(iv)	acid is in excess	**1**
1(d)(v)	**M1** independent: (relative) concentration of KI / (relative) concentration of I^- **M2** dependent: time (taken)	**2**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(e)(i)</td><td>
<table>
<tr><td>v / cm^3</td><td>log v</td><td>t_{av} / s</td><td>$(1 / t_{av})$ / s^{-1}</td><td>log$(1 / t_{av})$</td></tr>
<tr><td>5.00</td><td>0.699</td><td>219</td><td>0.00457</td><td>–2.34</td></tr>
<tr><td>10.00</td><td>1.00</td><td>113</td><td>0.00885</td><td>–2.05</td></tr>
<tr><td>12.50</td><td>1.10</td><td>100</td><td>0.0100</td><td>–2.00</td></tr>
<tr><td>15.00</td><td>1.18</td><td>76.5</td><td>0.0131</td><td>–1.88</td></tr>
<tr><td>20.00</td><td>1.30</td><td>59.0</td><td>0.0169</td><td>–1.77</td></tr>
<tr><td>25.00</td><td>1.40</td><td>48.0</td><td>0.0208</td><td>–1.68</td></tr>
</table>
M1 column 3 and column 6 mathematically correct
M2 column 3 and column 6 to 3 sf
</td><td>2</td></tr>
<tr><td>1(e)(ii)</td><td>M1 points plotted
M2 line of best fit</td><td>2</td></tr>
<tr><td>1(e)(iii)</td><td>M1 correct co-ordinates
M2 correct gradient (to 3 sf)
M3 first order</td><td>3</td></tr>
</table>

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Question	Answer	Marks
2(a)	$Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$	**1**
2(b)(i)	**M1** (buchner) funnel (with filter paper) **M2** sealed with a cork around the funnel	**2**
2(b)(ii)	increased rate (of filtration)	**1**
2(c)(i)	warm / heat to constant mass	**1**
2(c)(ii)	(5.736 g AND 5.736 / 143.4 =) 0.04(00)	**1**
2(c)(iii)	**M1** mol of MCl_2 = 0.04 / 2 = 0.02(00) **M2** molar mass of MCl_2 = 3.172 / 0.02 = 158.6 **M3** A_r of M = 158.6 – 71.0 = 87.6 and Sr	**3**
2(c)(iv)	increase because tap water contains chloride ions	**1**

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