GradeMax

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 2018**

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.

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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:<br><br>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:<br><br>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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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>Surrounding vessel of polystyrene / styrofoam / plastic containing water<br>and<br>Ice within the cooling mixture</td><td>1</td></tr>
<tr><td>1(b)(i)</td><td>Add dropwise around 20.00 g mark</td><td>1</td></tr>
<tr><td>1(b)(ii)</td><td>M1 Volume of cyclohexane 20.00 / 0.78 = 25.64 $cm^3$<br><br>M2 No<br>And<br>A burette can only measure ± 0.05 $cm^3$<br>Or<br>A burette cannot measure to 0.01 $cm^3$</td><td>2</td></tr>
<tr><td>1(b)(iii)</td><td>When transferring X, some may remain in the container<br>Or<br>It is not weighing by difference’</td><td>1</td></tr>
<tr><td>1(c)(i)</td><td>M1 values M2 3 sf<br><br><table><tr><td>1</td><td>0.0125</td></tr><tr><td>2</td><td>0.0200</td></tr><tr><td>3</td><td>0.0250</td></tr><tr><td>4</td><td>0.0400</td></tr><tr><td>5</td><td>0.0475</td></tr><tr><td>6</td><td>0.0575</td></tr><tr><td>7</td><td>0.0650</td></tr><tr><td>8</td><td>0.0700</td></tr></table></td><td>2</td></tr>
<tr><td>1(c)(ii)</td><td>M1 Points plotted<br><br>M2 Line of best fit</td><td>2</td></tr>
</table>

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| Question | Answer | Marks |
|---|---|---|
| 1(c)(iii) | Reading 8<br><br>**and**<br><br>A greater mass than 1.40 g was added | **1** |
| 1(c)(iv) | M1 B = 0.045(0)<br><br>M2 = M1 × 20.00 = 0.90 g | **2** |
| 1(c)(v) | M1 = Co-ordinates<br><br>M2 = correct gradient calculation | **2** |
| 1(d) | Correct calculation of [20 020 / 1cv] = | **1** |
| 1(e) | $C_6H_5–CH_2–COOH$<br>Or<br>$CH_3–C_6H_4–COOH$ | **1** |

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| Question | Answer | Marks |
|---|---|---|
| 2(a)(i) | $0.0200 \times 5 = 0.1(00)$ mol $dm^{-3}$ | **1** |
| 2(a)(ii) | M1 = 277.9 (seen anywhere)<br><br>M2 = M1 × 0.1(00) × 250 / 1000 = 6.9475<br><br>M3 = M2 × 100 / 8 = 86.84 g | **3** |
| 2(a)(iii) | M1 = total moles of $H^+$ =<br>(0.100 × 8 / 5 × 250 / 1000) = 0.04(00) mol<br><br>M2 = volume of 2 mol $dm^{-3}$ sulfuric acid =<br>(M1 / 2) × (1000 / 2) = 10 $cm^3$ | **2** |
| 2(b) | M1 Dissolve the iron(II) sulfate crystals (in the beaker) using (distilled) water<br><br>M2 Filter<br><br>M3 Rinse the residue<br>If no M2 (filtration), M3 can be applied to mixture in M1 as part of transfer in M5.<br><br>M4 Add $H_2SO_4$<br><br>M5 Transfer / add to a 250 $cm^3$ volumetric flask and make up to mark with (distilled) water | **5** |
| 2(c) | Colourless to pink / pale purple | **1** |
| 2(d) | M1 Higher<br>M2 Some of the $MnO_4^-$ (aq) would be used oxidising $Cl^-$(aq) ions | **2** |

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