Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CHEMISTRY **5070/42**

Paper 4 Alternative to Practical **May/June 2019**

MARK SCHEME

Maximum Mark: 60

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.

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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.

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.

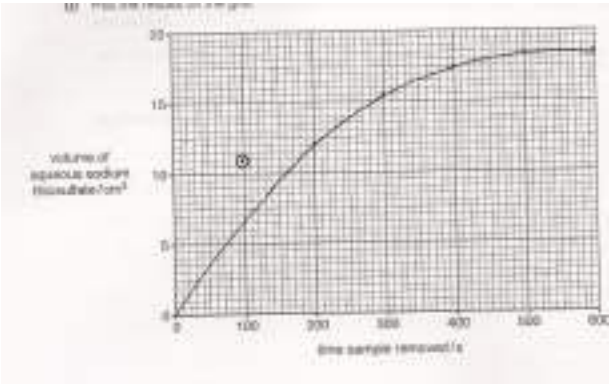
<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>**A** = conical flask / Erlenmeyer flask (1)

B = pipette (1)

C = burette (1)</td><td>**3**</td></tr>
<tr><td>1(b)(i)</td><td>
<table>
<tr><td>titration number</td><td>**1**</td><td>**2**</td><td>**3**</td><td>**4**</td></tr>
<tr><td>final burette reading / cm^3</td><td>24.1</td><td>47.5</td><td>**23.6**</td><td>24.4</td></tr>
<tr><td>initial burette reading / cm^3</td><td>0.0</td><td>23.7</td><td>**0.3**</td><td>**0.8**</td></tr>
<tr><td>volume of 0.600 mol / dm^3 hydrochloric acid used / cm^3</td><td>**24.1**</td><td>23.8</td><td>**23.3**</td><td>23.6</td></tr>
</table>
</td><td>**3**</td></tr>
<tr><td>1(b)(ii)</td><td>23.7 (cm^3)</td><td>**1**</td></tr>
<tr><td>1(b)(iii)</td><td>(water) only changes concentration / does not affect amount **or** moles (of $Mg(OH)_2$)</td><td>**1**</td></tr>
<tr><td>1(c)(i)</td><td>0.01398 / 1.398×10^{-2}</td><td>**1**</td></tr>
<tr><td>1(c)(ii)</td><td>0.00699 / 6.99×10^{-3}</td><td>**1**</td></tr>
<tr><td>1(c)(iii)</td><td>**M1** M_r = 58 (1)
M2 0.405 (g) (1)</td><td>**2**</td></tr>
<tr><td>1(c)(iv)</td><td>11.7 (g)</td><td>**1**</td></tr>
<tr><td>1(c)(v)</td><td>3.47(%)</td><td>**1**</td></tr>
</table>

Question	Answer	Marks
2	**MARKS CAN SCORE IN DIAGRAM AND IN TEXT** **M1** chromatography methods **M2** spots of sample **and** E150a **and** E155 (1) **M3** solvent in jar / beaker with level below base line (or on diagram) (1) **M4** baseline **drawn in pencil** (1) **M5** let solvent run (to near top of paper) **OR** solvent front mentioned (1) **M6** compare position of spot(s) from sample with spots from E150a / E155 **OR** (measure) Rf / retention factor (1)	**6**

Question	Answer	Marks
3(a)(i)	**M1** cathode: pink / brown **and** solid **M2** anode: bubbles / fizzing / effervescence	**2**
3(a)(ii)	**M1** glowing splint (into tube of gas) **M2** relights / rekindles	**2**
3(a)(iii)	**M1** colour fades / becomes paler blue / goes colourless **M2** as Cu^{2+} / copper ions concentration falls	**2**
3(b)(i)	colour stays the same	**1**
3(b)(ii)	**M1** mass of cathode increases (1) **M2** mass of anode decreases (1) **M3** copper **removed** from anode **and** copper **forms** on cathode (1)	**3**
3(b)(iii)	copper purification / copper refining / electroplating	**1**

Question	Answer	Marks
4(a)	solution turns brown	**1**
4(b)(i)	(calcium carbonate) neutralises the acid	**1**
4(b)(ii)	increase rate (of reaction)	**1**
4(b)(iii)	effervescence / bubbles / fizzing **OR** (calcium carbonate) dissolves / disappears	**1**
4(c)(i)	**POINTS**  6 / 7 points correct = 2 marks 4 / 5 points correct = 1 mark	**2**
4(c)(ii)	**ANOMALOUS POINT** mark is for circle round point at 100, 11	**1**
4(c)(iii)	**CURVE** **smooth** curve through all the points except the anomalous one	**1**
4(c)(iv)	13.5 (cm^3)	**1**
4(c)(v)	80 (s)	**1**

Question	Answer	Marks
4(c)(vi)	**M1** gradient or slope decreases (1) **M2** rate decreases (with time) (1) **M3** as concentration decreases (1) **M4** lower collision frequency (1)	**4**

Question	Answer	Marks
5(a)	**M1** add copper oxide **or** copper carbonate **or** copper hydroxide (1) **M2** dilute sulfuric acid (1) **M3** (solid added until in) excess / no more dissolves / solid is seen / no more bubbles (with carbonate) **M4** filter (the solution to remove excess solid) **M5** heat / warm / evaporate / boil / leave (the solution) **AND** until signs of crystal formation / saturated (solution) / crystallisation (point) / crystals form on glass rod or other surface / crystals can be seen	**5**
5(b)	**M1** (mix)silver nitrate solution / aqueous silver nitrate **M2** with any named solution of a soluble chloride **M3** filter **M4** wash (residue) with water **and** dry on filter paper	**4**

Question	Answer	Marks
6(a)	**M1** carbon dioxide (1) **M2** carbonate present (1)	**2**
6(b)	white precipitate	**1**
6(c)	**M1** white precipitate (1) **M2** insoluble in excess (1)	**2**
6(d)	no (visible) change / no reaction / no precipitate seen / slight (white) precipitate	**1**