Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CHEMISTRY **5070/41**

Paper 4 Alternative to Practical **May/June 2018**

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.

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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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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>**A** = burette (1)
B = conical / Erlenmeyer flask (1)
C = volumetric / graduated flask (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>19.0</td><td>36.4</td><td>19.1</td><td>18.8</td></tr>
<tr><td>initial burette reading / cm^3</td><td>0.0</td><td>18.4</td><td>0.4</td><td>0.6</td></tr>
<tr><td>volume of 0.025 mol / dm^3 sodium hydroxide used / cm^3</td><td></td><td>18.0</td><td></td><td>18.2</td></tr>
<tr><td>best titration results (✓)</td><td></td><td></td><td></td><td></td></tr>
</table>
M1 final **and** initial readings correct (1)
M2 volume used correct (1)</td><td>**2**</td></tr>
<tr><td>1(b)(ii)</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>19.0</td><td>36.4</td><td>19.1</td><td>18.8</td></tr>
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<tr><td>volume of 0.025 mol / dm^3 sodium hydroxide used / cm^3</td><td>19.0</td><td>18.0</td><td>18.7</td><td>18.2</td></tr>
<tr><td>best titration results (✓)</td><td></td><td></td><td></td><td></td></tr>
</table>
both numbers needed</td><td>**1**</td></tr>
<tr><td>1(b)(iii)</td><td>ticks under columns 2 and 4 in results table
18.1 (cm^3)</td><td>**1**</td></tr>
<tr><td>1(b)(iv)</td><td>**M1** use pipette (instead of measuring cylinder to measure solution into flask) (1)
M2 less uncertainty / less apparatus error / less error in measurement (1)</td><td>**2**</td></tr>
<tr><td>1(c)(i)</td><td>0.00046 / 4.6×10^{-4} (mol)</td><td>**1**</td></tr>
<tr><td>1(c)(ii)</td><td>0.00046 / 4.6×10^{-4} (mol)</td><td>**1**</td></tr>
</table>

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Question	Answer	Marks
1(c)(iii)	0.0046 / 4.6×10^{-3} (mol)	**1**
1(c)(iv)	0.92 / 9.2×10^{-1} (mol / dm^3)	**1**

Question	Answer	Marks
2(a)	ANY **TWO** from: • effervescence / bubbles / bubbling / fizzing • carbon dioxide • gas/carbon dioxide turns limewater milky	**2**
2(b)	**L** contains SO_4^{2-} ions	**1**
2(c)(i),(ii)	**M1** light-blue precipitate (forms) (1) **M2** dissolves / soluble / solution (1) **M3** leaving a dark blue solution (1)	**3**

Question	Answer	Marks
3(a)	ink would dissolve / ink will separate / spread	**1**
3(b)	line drawn above bottom of chromatogram and below bottom of spot	**1**
3(c)	locating agent	**1**
3(d)	breaks amide / peptide links / produces free amino acids	**1**
3(e)	only 3 (different) amino acids (in tetrapeptide) / 2 amino acids have same R_f	**1**
3(f)(i)	distance travelled by spot **and** distance travelled by solvent (1) distance travelled by spot **divided by** distance travelled by solvent (1)	**2**
3(f)(ii)	3.4 / 5 = 0.68 (1) phenylalanine present (1)	**2**

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Question	Answer	Marks
4(a)	pink/brown solid (coating surface of zinc) (1) solution becoming paler blue/colourless/decolourised (1)	**2**
4(b)(i)	magnesium zinc tin copper	**1**
4(b)(ii)	**3 ideas = 2 marks; 2 ideas = 1 mark; 1 idea = 0 marks** magnesium displaces / reacts with all others / all entries are yes copper reacts with none / all entries are no zinc displaces tin	**2**
4(c)	**M1** acid + metal in a container (1) **M2** equal volume / concentration / amount of acid in each (1) **M3** Measure T_1 (1) **M4** Measure T_2 (1) **M5** biggest change in temperature = highest reactivity / smallest change in temperature = lowest reactivity (1)	**5**

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Question	Answer	Marks
5(a)(i)	insoluble in water / slightly soluble / low solubility	**1**
5(a)(ii)	(gas) syringe / burette	**1**
5(a)(iii)	**M1** glowing splint (1) **M2** relights (1)	**2**
5(b)(i)	7 or 8 points correctly plotted = 2 marks 5 or 6 points correctly plotted = 1 mark <5 points correctly plotted = 0 marks	**2**
5(b)(ii)	circle round point at 4,50	**1**
5(b)(iii)	smooth line through remaining points	**1**
5(b)(iv)	**M1** starts at 0,0 and initially steeper (1) **M2** levels off at same height (1) **M3** rate greater at higher temperature (1) **M4** (same total volume of gas produced as) same volume / amount of peroxide / reactants (1)	**4**

Question	Answer	Marks
6(a)	**M1** add water (to mixture) to dissolve sodium chloride (1) **M2** heat / stir (1) **M3** filter (with funnel / filter paper to separate sand from solution) (1) **M4** wash sand / residue (1) **M5** evaporate solution / filtrate **or** crystallise solution / filtrate (1)	**5**
6(b)	**M1** heat / boil mixture (1) **M2** distil / (fractional) distillation / fractionation (1) **M3** mention of indirect heating / water bath / heating mantle (1) **M4** lower b.pt. alcohol / more volatile / ethanol boils off / higher b.pt. alcohol / butanol remains in flask (1) **M5** condense (vapour) / (use of) a condenser (1)	**5**

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