Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CHEMISTRY **5070/41**

Paper 4 Alternative to Practical **October/November 2017**

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.

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Abbreviations used in the mark scheme

- / separates alternatives within a marking point.
- **OR** gives the alternative marking point.
- **Allow** indicates an answer that is less than ideal but which should be marked correct.
- **Ignore** means mark as if the response was not there.
- **Reject** means the response is not given credit
- **M1**, **M2** etc. distinguish each marking point within an answer
- Ecf (error carried forward) means credit a correct statement / working that follows from a previous wrong response.
- Use of brackets in the Answer column indicates that the word(s) is / are ideal but not required to obtain the mark.

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Question	Answer	Marks
1(a)	**M1** chlorine (1) **M2** litmus paper bleached (1)	**2**
1(b)	**M1** hydrogen (1) **M2** pops in a flame / lighted splint pops/burning splint pops (1)	**2**
1(c)(i)	dilute sulfuric acid (1)	**1**
1(c)(ii)	**M1** oxygen (1) **M2** glowing splint (re)lights / rekindles (1)	**2**

Question	Answer	Marks
2	add liquid hydrocarbon / heptane **AND** stir / shake / heat / mix (1) fullerene dissolves / impurities do not dissolve (1) filter / decant / centrifuge (1) evaporate the heptane / hydrocarbon / solvent / filtrate / liquid (1)	**4**

Question	Answer	Marks
3(a)(i)	water in at the bottom and water out at the top (1)	**1**
3(a)(ii)	bung required in the flask (1) remove bung (at top of condenser) (1)	**2**
3(b)(i)	(Liebig / reflux) condenser (1)	**1**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(b)(ii)</td><td>(so that) liquid will fall back (into flask) (1)</td><td>1</td></tr>
<tr><td>4(a)</td><td>0.42 (1)</td><td>1</td></tr>
<tr><td>4(b)(i)</td><td>volumetric flask / standard flask / graduated flask (1)</td><td>1</td></tr>
<tr><td>4(b)(ii)</td><td>(to make sure) all the acid goes into B (1)</td><td>1</td></tr>
<tr><td>4(c)</td><td>red / pink to orange / yellow (1)</td><td>1</td></tr>
<tr><td>4(d)(i)</td><td>M1 more accurate (1)

M2 because an average can be taken / can use concordant results (1)</td><td>2</td></tr>
<tr><td>4(d)(ii)</td><td>
<table>
<tr><td>titration number</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>final burette reading / cm^3</td><td>23.4</td><td>49.2</td><td>33.6</td></tr>
<tr><td>initial burette reading / cm^3</td><td>0.0</td><td>24.8</td><td>10.0</td></tr>
<tr><td>volume of 0.100 mol / dm^3 sodium hydroxide NaOH / cm^3</td><td>23.4</td><td>24.4</td><td>23.6</td></tr>
<tr><td>best titration results (✓)</td><td>✓</td><td></td><td>✓</td></tr>
</table>
Mark rows or columns to the benefit of the candidate i.e. one mark for each correct row or one mark for each correct column, whichever way gives the candidate the most marks (3)

average = 23.5 cm^3 (1)</td><td>4</td></tr>
<tr><td>4(e)</td><td>0.00235 (1)</td><td>1</td></tr>
<tr><td>4(f)</td><td>0.00235 or ecf on (e) (1)</td><td>1</td></tr>
<tr><td>4(g)</td><td>0.0235 or ecf (f) × 10 (1)</td><td>1</td></tr>
<tr><td>4(h)</td><td>0.0250 (1)</td><td>1</td></tr>
<tr><td>4(i)</td><td>0.00150 or ecf (h) – (g) (1)</td><td>1</td></tr>
</table>

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Question	Answer	Marks
4(j)	0.000750 or ecf **(i)** / 2 (1)	**1**
4(k)	0.0630 or ecf **(j)** × 84 (1)	**1**
4(l)	15 or ecf **(k)** ÷ **(a)** × 100 (1)	**1**
4(m)	unchanged (1) moles of acid is the same in each titration (1)	**2**

Question	Answer	Marks
5(a)	(**L** contains) ions of a transition metal / ions of a transition element / a compound of a transition metal / (**L**) a compound of a transition element (1)	**1**
5(b)	green precipitate (1) insoluble / no change / (green) precipitate (1)	**2**
5(c)	**M1** green precipitate (1) **M2** soluble / dissolves / (forms) solution (1) **M3** green solution (1)	**3**
5(d)	**M1** dilute nitric acid / HNO_3 (1) **M2** silver nitrate solution / $AgNO_3$ (1) **M3** white precipitate (1)	**3**

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Question	Answer	Marks
6(a)	protective gloves (1) eye protection / goggles / safety glasses (1)	**2**
6(b)	allow gas to escape / prevent liquid from escaping (1)	**1**
6(c)	mass (1) time (1)	**2**
6(d)(i)	vessel in which reaction occurs e.g. conical flask (1) vessel to collect and measure volume of gas e.g. gas syringe / inverted burette (1) no blockages to prevent gas being collected and no openings that gas can escape through (1)	**3**
6(d)(ii)	points (1) smooth curve (1)	**2**
6(e)(i)	Answers should correspond to candidate's graph. 34 (1) (48 – 34 =) 14 (1)	**2**
6(e)(ii)	Candidate's answers from (e)(i) divided by 50. 0.68 (1) 0.28 (1)	**2**
6(e)(iii)	rate decreases because concentration decreases (1)	**1**

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