Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CHEMISTRY **5070/42**

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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>
<table>
<tr><td>electrolyte</td><td>name of product at the anode</td><td>observations at the anode</td><td>name of product at the cathode</td><td>observations at the cathode</td></tr>
<tr><td>concentrated aqueous sodium chloride</td><td>M1 chlorine (1)</td><td>M2 green / yellow bubbles (of gas) (1)</td><td>M3 hydrogen(1)</td><td></td></tr>
<tr><td>M4 aqueous copper(II) sulfate / aqueous $CuSO_4$ (1)</td><td></td><td>M5 colourless bubbles (of gas) (1)</td><td></td><td>M6 pink / brown solid (1)</td></tr>
</table>
</td><td>6</td></tr>
<tr><td>1(b)</td><td>(re)lights glowing splint (1)</td><td>1</td></tr>
</table>

Question	Answer	Marks
2(a)	purple / pink to colourless / decolourised (1)	**1**
2(b)(i)	chromatography (1)	**1**
2(b)(ii)	**M1** no lid / container not covered/container open (1) **M2** solvent level above base line (or reverse argument) (1)	**2**
2(c)	no flames (in vicinity) (1)	**1**

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Question	Answer	Marks
3(a)	carbon dioxide (1)	**1**
3(b)(i)	same height of flame / same opening of air hole / gas tap turned on by same amount / flame is the same distance from the test tube / same strength of flame (1)	**1**
3(b)(ii)	Any **two** from: • same volume of limewater • same concentration of limewater • same amount of solid / same moles of solid / same mass of solid • same surface area / same particle size of solid	**2**
3(c)	copper(II) carbonate (1)	**1**
3(d)	**M1** draw a cross (1) **M2** measure time when cross no longer visible (1) **Allow** make sure same person carries out each experiment for (1) only	**2**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(a)</td><td>1.37 (1)</td><td>1</td></tr>
<tr><td>4(b)(i)</td><td>pipette (1)</td><td>1</td></tr>
<tr><td>4(b)(ii)</td><td>pipette filler / bulb (1)</td><td>1</td></tr>
<tr><td>4(b)(iii)</td><td>(acid is) toxic / corrosive (to mouth) / causes burns (to mouth) (1)</td><td>1</td></tr>
<tr><td>4(c)(i)</td><td>volumetric flask / standard flask / graduated flask (1)</td><td>1</td></tr>
<tr><td>4(c)(ii)</td><td>(make sure) all the acid goes into B / nothing remains in beaker (1)</td><td>1</td></tr>
<tr><td>4(d)(i)</td><td>pipette more accurate / measuring cylinder less accurate (1)</td><td>1</td></tr>
<tr><td>4(d)(ii)</td><td>pink / red to orange / yellow (1)</td><td>1</td></tr>
<tr><td>4(e)</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>23.2</td><td>46.5</td><td>32.5</td></tr>
<tr><td>initial burette reading / cm^3</td><td>0.0</td><td>24.2</td><td>10.0</td></tr>
<tr><td>volume of 0.100 mol / dm^3 sodium hydroxide NaOH / cm^3</td><td>23.2</td><td>22.3</td><td>22.5</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 = 22.4 cm^3 (1)</td><td>4</td></tr>
<tr><td>4(f)</td><td>0.00224 or ecf using incorrect titre in (e) (1)</td><td>1</td></tr>
</table>

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Question	Answer	Marks
4(g)	0.00224 **or** ecf answer to **(f)** (1)	**1**
4(h)	0.0224 **or** ecf **(g)** × 10 (1)	**1**
4(i)	0.05 (1)	**1**
4(j)	0.0276 **or** ecf **(i)** – **(h)** (1)	**1**
4(k)	0.0138 **or** ecf **(j)** ÷ 2 (1)	**1**
4(l)	1.02(12) **or** ecf **(k)** × 74 (1)	**1**
4(m)	74.5(40) **or** ecf **(l)** ÷ **(a)** × 100 (1)	**1**
4(n)	**M1** larger (1) **M2** more acid (requires more alkali or more sodium hydroxide) / the methyl orange needs alkali (or sodium hydroxide) to react with it / methyl orange reacts with alkali (or sodium hydroxide) (1)	**2**

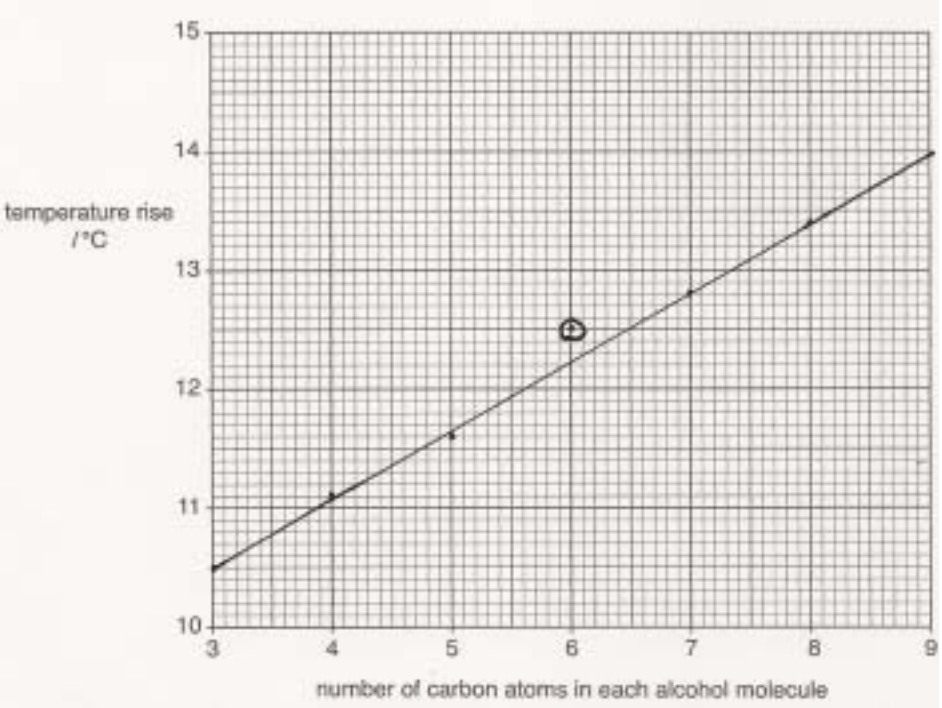
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Question	Answer	Marks
5(a)	(**L** contains) ions of a transition metal / ions of a transition element / a compound of a transition metal / (**L** is) a compound of a transition element (1)	**1**
5(b)	green precipitate (1) insoluble / no change / (green)precipitate (1)	**2**
5(c)	**M1** green precipitate (1) **M2** soluble / dissolves / (forms) solution (1) **M3** green solution (1)	**3**
5(d)	**M1** aqueous barium chloride / aqueous $BaCl_2$ / aqueous barium nitrate / aqueous $Ba(NO_3)_2$ (1) **M2** dilute nitric acid / aqueous HNO_3 **OR** dilute hydrochloric acid / aqueous HCl (1) **M3** white precipitate (1)	**3**

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Question	Answer	Marks
6(a)(i)	**M1** mass (of burner and contents) at start **and** finish (1) **M2** temperature(of water) at start **and** finish (before and after **burning** or before and after **using** the ethanol) (1)	**2**
6(a)(ii)	Any **two** from: • heat / energy loss (to surroundings) • heat / energy gained by metal can or tripod • incomplete combustion • evaporation of **ethanol** (after first weighing or before second weighing)	**2**
6(a)(iii)	Any **two** from: • (use) lid / close the can • insulation / lagging (the can) • reduce distance between flame and can / move burner closer • draught shields	**2**

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Question	Answer	Marks
6(b)	**M1** all points correct (1) **M2** line of best fit (1)  	**2**
6(c)	circled point at 6, 12.5 **and** correct value from candidate's graph (1)	**1**
6(d)	Use result from candidate's graph 14.0 (1)	**1**

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