Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CHEMISTRY **5070/42**

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>
<table>
<tr><th>fuel</th><th>initial temperature /°C</th><th>final temperature /°C</th><th>temperature change /°C</th></tr>
<tr><td>hexane</td><td>20.2(0)</td><td>56.7(0)</td><td>36.5(0)</td></tr>
<tr><td>octane</td><td>22.6(0)</td><td>63.4(0)</td><td>40.8(0)</td></tr>
</table>
M1 All initial and final temperatures correct (1)
M2 Both temperature changes correct using the candidate’s values (1)
</td><td>2</td></tr>
<tr><td>1(b)</td><td>heat loss to surroundings / incomplete combustion of the fuel / some heat transferred to the can or tripod / some hexane or octane evaporates</td><td>1</td></tr>
<tr><td>1(c)(i)</td><td>octane AND has larger / higher temperature change / increase</td><td>1</td></tr>
<tr><td>1(c)(ii)</td><td>exothermic</td><td>1</td></tr>
</table>

Question	Answer	Marks
2(a)(i)	pipette	**1**
2(a)(ii)	burette	**1**
2(b)(i)	15.6, 15.2, 15.0 **all 3 correct**	**1**
2(b)(ii)	ticks in columns 2 and 3 **AND** results in 2 and 3 are ±0.2 cm^3 / results 2 and 3 are concordant	**1**
2(b)(iii)	15.1	**1**
2(c)	$0.000755 / 7.55 \times 10^{-4}$	**1**
2(d)	$0.000755 / 7.55 \times 10^{-4}$	**1**

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Question	Answer	Marks
2(e)	0.0302	**1**
2(f)(i)	0.302	**1**
2(f)(ii)	(diluted using) measuring cylinder instead of pipette / burette	**1**

Question	Answer	Marks
3	**M1** mix hydrochloric acid and calcium carbonate in any container (1) **M2** gas syringe or measuring cylinder over water / burette over water (1) **M3** some indication of how to mix reactants with minimum loss of gas **or** indication of gas-tight apparatus (1) **M4** measurement of volume (of gas) (1) **M5** measurement of time (1) **M6** rate = volume ÷ time **or** plot graph **and** measure gradient **or** comment on steepness of graph (1)	**6**

Question	Answer	Marks
4(a)	**M1 dissolve** in **water** (1) **M2** filter (1)	**2**
4(b)	ions in **L**: ammon**ium** (1) and: sulfate (1)	**2**
4(c)(i)	**M1** add limewater / calcium hydroxide solution (1) **M2** milky / white precipitate (1)	**2**
4(c)(ii)	carbonate	**1**
4(d)	**M1** add aqueous sodium hydroxide (1) **M2** white precipitate (1) **M3** insoluble in excess / white precipitate remains in excess (1)	**3**
5(a)(i)	**M1** all points plotted correctly (1) **M2** smooth curve of best fit (not including anomalous point) (1)	**2**

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Question	Answer	Marks
5(a)(ii)	point at (15,15) circled (1)	**1**
5(a)(iii)	correct value read from the candidate's graph	**1**
5(b)	check that the values are correct / to take averages	**1**
5(c)	speed up reaction / increase rate / make reaction faster	**1**
5(d)	time where line first becomes horizontal on the candidate's graph	**1**

Question	Answer	Marks
6(a)	**X** **M1** brown solution **OR** black solid (1) **Y** **M2** purple (1) **M3** to colourless / decolourised (1) **Z** **M4 and M5, any two from:** • metal / solid disappears **OR** forms a solution (1) • effervescence / bubbles / fizzing (1) • mention of heat evolved (1)	**5**
6(b)(i)	hydrogen	**1**
6(b)(ii)	**M1** flame / burning splint / lighted splint (1) **M2** pops (1)	**2**

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Question	Answer	Marks
7(a)	potassium carbonate	**1**
7(b)	any reasonable smooth continuation of the curve	**1**
7(c)	85	**1**
7(d)(i)	197	**1**
7(d)(ii)	**M1** correct reading at 20 °C (1) **M2** correct subtraction (1)	**2**

Question	Answer	Marks
8(a)	**M1** prevent **solid / MCO_3 / MO** escaping (1) **M2** allow **gas** or **carbon dioxide** to escape / to prevent pressure building up (1)	**2**
8(b)	<table><tr><td>10.1</td><td>12.6</td><td>11.7</td><td>**2.5**</td><td>**0.9**</td></tr></table> 1 mark for each correct value (2)	**2**
8(c)	not all solid had decomposed / (more) gas is produced / (more) carbon dioxide is produced	**1**
8(d)	(1.1 / 44 =) **0.025** (moles)	**1**
8(e)	(M_r = 2.5 / 0.025) = **100**	**1**
8(f)	(100 – 60) = **40**	**1**

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