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**CHEMISTRY****5070/42**

Paper 4 Alternative to Practical

**May/June 2016**

MARK SCHEME

Maximum Mark: 60

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**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 will not enter into discussions about these mark schemes.

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<b>Page 2</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge O Level – May/June 2016</b>	<b>5070</b>	<b>42</b>

### Abbreviations used in the mark scheme

- / separates alternatives within a marking point.
- **or** gives the alternative marking point.
- **Allow/accept** 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
- Ecf 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.

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge O Level – May/June 2016	5070	42

Question	Answer	Marks
1(a)	M1: <b>Thermometer / bulb</b> Thermometer / bulb is too low / should be higher / should not touch the beads / should be at entrance to condenser (1)  M2: <b>Receiver / conical flask / C</b> There should be no bung or cork on <b>C / C</b> should be open (1)	2
1(b)(i)	Fractionating column	1
1(b)(ii)	Separate components / separate mixture / separate heptane and hexane / separate liquids / stop heptane reaching condenser	1
1(b)(iii)	Condenser	1
1(b)(iv)	(To convert) vapour / gas to liquid <b>or</b> liquefy vapour / gas <b>or</b> condense vapour / gas	1
1(c)(i)	69 °C	1
1(c)(ii)	Hexane	1
1(d)	M1 Electric (heater) / water bath / hot plate / (1)  M2 (components of mixture are) flammable / inflammable (1)	2

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge O Level – May/June 2016	5070	42

Question	Answer	Marks		
2(a)	M1 (aqueous) NaOH/ sodium hydroxide (solution) (1) M2 Al/ aluminium(foil)/ Devardas alloy (1) M3 Heat/ warm (1) M4 Ammonia <b>or</b> <b>gas</b> turns litmus blue (1)	4		
2(b)	M1 Heat (1) M2 To crystallisation point/ saturation (point) (1) M3 Wash <b>and</b> dry (crystals) (1)	3		
2(c)(i)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>21</td></tr> <tr><td>24</td></tr> </table> (1) (-) <sup>3</sup> (1)	21	24	2
21				
24				
2(c)(ii)	Endothermic	1		

Question	Answer	Marks
3(a)(i)	1.3(0) g	1
3(a)(ii)	1.62 g	1
3(a)(iii)	0.32 g	1
3(a)(iv)	M1 1.30/65 and 0.32/16 <b>or</b> 0.02 and 0.02 <b>or</b> both 1/50 (1) M2 ZnO (1)	2
3(b)	Hydrogen (1) Pops in a flame/ lighted splint pops/ burning splint pops (1)	2

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge O Level – May/June 2016	5070	42

Question	Answer	Marks
4	B	1

Question	Answer	Marks
5	A	1

Question	Answer	Marks
6	C	1

Question	Answer	Marks												
7(a)	Blue to colourless	1												
7(b)	<table style="margin-left: 20px;"> <tr> <td>28.1</td> <td>30.9</td> <td>47.1</td> <td></td> </tr> <tr> <td>0.0</td> <td>3.5</td> <td>19.5</td> <td>(3)</td> </tr> <tr> <td style="border-top: 1px solid black;">28.1</td> <td style="border-top: 1px solid black;">27.4</td> <td style="border-top: 1px solid black;">27.6</td> <td></td> </tr> </table> Mean titre 27.5 cm <sup>3</sup> (1)	28.1	30.9	47.1		0.0	3.5	19.5	(3)	28.1	27.4	27.6		4
28.1	30.9	47.1												
0.0	3.5	19.5	(3)											
28.1	27.4	27.6												
7(c)	$0.0025 / 2.5 \times 10^{-3}$	1												
7(d)	$0.0025 / 2.5 \times 10^{-3}$	1												
7(e)	$0.0909 / 9.09 \times 10^{-2}$	1												
7(f)	88	1												
7(g)	M1 ( $M_r$ of COOH) = 45 or 12 + 16 + 16 + 1 or 12 + 32 + 1 (1) M2 n = 3 (1) M3 C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> (1) M4 butanoic acid / methyl propanoic acid (1)	4												

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge O Level – May/June 2016	5070	42

Question	Answer	Marks
8(a)	Colourless (solution)	1
8(b)	<b>(Both)</b> $Al^{3+}$ or $Zn^{2+}$ (ions present)	1
8(c)	$Al^{3+}$ (ions confirmed)	1
8(d)	M1 (dilute) $HNO_3$ / nitric acid ignore acidify(1) M2 (aq) aqueous solution of $AgNO_3$ / silver nitrate (1) M3 white precipitate(1)	3
8(e)	$AlCl_3$	1

Question	Answer	Marks
9(a)	White	1
9(b)	1.3(0), 1.95, 2.6(0), 2.8(0), 2.8(0)	1
9(c)(i)	All points correct (1) (Only) two intersecting straight lines, one mark for each line (2)	3
9(d)(i)	Value as read from graph (correct to within 0.1) e.g. 3.7	1
9(d)(ii)	Value as read from graph (correct to within 0.025) e.g. 2.8	1
9(d)(iii)	Value as read from graph (correct to within 0.1) e.g. 8.6	1
9(e)	M1 $\frac{10 \times 1.2}{8.6}$ (1)  <b>OR</b> (moles $BaCl_2$ ) = $\frac{10 \times 1.2}{1000}$ or = 0.012 (1)  M2 1.395 / 1.4 (1) ( $mol/dm^3$ )	2