Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/42**

Paper 4 Alternative to Practical **May/June 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.

Cambridge will not enter into discussions about these mark schemes.

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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 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.

Question	Answer	Marks
1(a)(i)	Pops in a flame / lighted splint pops / burning splint pops	**1**
1(a)(ii)	**A** – conical flask (1) **B** – gas syringe (1)	**2**
1(a)(iii)	46 (cm^3)	**1**
1(b)(i)	**Y** (1) The gas must bubble **through / into** the drying agent (1)	**2**
1(b)(ii)	The gas can enter the tube and leave it without passing through the drying agent (or reverse argument)	**1**
2(a)	To prevent explosion / to prevent build-up of pressure / to prevent pressure increase	**1**
2(b)(i)	141 (°C)	**1**
2(b)(ii)	Propanoic acid	**1**
2(b)(iii)	The temperature will begin to rise (again)	**1**
2(c)	Safety goggles / safety glasses	**1**

Question	Answer	Marks
3(a)	**Method 1** M1 Weigh crystals / weigh **before** heating (1) M2 Heat to ensure that all water has been removed / heat to dryness / heat to **constant mass** / heat until solid turns white (1) M3 Weigh anhydrous salt / weigh **after** heating (1) M4 (Calculate mass of water by) subtraction of masses / calculate **decrease or loss** in mass (This mark can score from the expression in M5) (1) M5 Mass of water or decrease in mass ÷ mass of crystals · 100 = % water (1) **OR** **Method 2** M1 Weigh crystals / weigh before heating (1) M2 Heat to ensure that **all** water has been removed / heat to dryness / heat to **constant mass** / heat until (solid) turns white (1) M3 Condense water (can be shown in diagram) / (obtain water by) distillation (can be shown in diagram) (1) M4 Weigh water (1) M5 Mass of water ÷ mass of crystals · 100 = % water (1)	**5**
3(b)	Any **three** from: M1 Not all the water is removed or evaporated / some water is left (in the crystals) (1) M2 Some water remained gaseous **or** evaporated **or** escaped. All of these need to be qualified by adding **either** and were not collected **or** during collection (1) M3 Not heated (long) enough / stopped heating too soon/ should have been heated longer / should be heated until it turns white (1) M4 Heat to constant mass (of solid) / heat to constant volume or constant mass of water (1)	**3**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(a)</td><td>1.22 (g)</td><td>1</td></tr>
<tr><td>4(b)</td><td>Effervescence / fizzing / bubbling</td><td>1</td></tr>
<tr><td>4(c)(i)</td><td>Volumetric flask / standard flask / graduated flask</td><td>1</td></tr>
<tr><td>4(c)(ii)</td><td>M1 Safety bulb / pipette filler (1)

M2 Prevent liquid entering mouth / (acids) cause burns to skin / (acids) corrosive to skin (1)</td><td>2</td></tr>
<tr><td>4(d)</td><td>Red or pink to orange or yellow</td><td>1</td></tr>
<tr><td>4(e)</td><td>
<table>
<tr><td>24.1</td><td>41.1</td><td>28.5</td></tr>
<tr><td>0.0</td><td>17.6</td><td>4.8</td></tr>
<tr><td>24.1</td><td>23.5</td><td>23.7</td></tr>
<tr><td></td><td>✓</td><td>✓</td></tr>
</table>
3 marks: award 1 mark for each correct row or column to the benefit of the candidate (3)

Titre = 23.6 (1)
</td><td>4</td></tr>
<tr><td>4(f)</td><td>0.00236 (moles) OR ecf on candidate’s mean titre</td><td>1</td></tr>
<tr><td>4(g)</td><td>0.00236 (moles) OR ecf (f)</td><td>1</td></tr>
<tr><td>4(h)</td><td>0.0236 (moles) OR ecf (g) × 10</td><td>1</td></tr>
<tr><td>4(i)</td><td>0.0264 (moles) OR ecf 0.0500 – (h)</td><td>1</td></tr>
<tr><td>4(j)</td><td>0.0132 (moles) OR ecf (i) ÷ 2</td><td>1</td></tr>
<tr><td>4(k)(i)</td><td>1.1088 / 1.109 / 1.11 (g) OR ecf (j) × 84</td><td>1</td></tr>
<tr><td>4(k)(ii)</td><td>(1.11 / 1.22 · 100 =) 91.0 (%) OR ecf (k)(i)/(a) × 100</td><td>1</td></tr>
</table>

Question	Answer	Marks
5(a)	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**
5(b)(i)	Fe^{3+} / iron(III) (1) Cu^{2+} / copper(II) (1) Fe^{2+} / iron(II) (1) Cr^{3+} / chromium(III) (1)	**4**
5(b)(ii)	M1 (Grey-)green precipitate; insoluble in excess / no change (1) M2 Green precipitate; insoluble in excess / no change (1) M3 Light blue precipitate; (soluble in excess) deep blue solution (1) M4 Red-brown precipitate; insoluble in excess / no change (1)	**4**

Question	Answer	Marks
6(a)	M1 All points plotted correctly (1) M2 Smooth curve (1) M3 Extension of line to cross y-axis (1)	**3**
6(b)(i)	13.9	**1**
6(b)(ii)	13(.0)	**1**
6(c)(i)	7.0	**1**
6(c)(ii)	27.5 (cm^3)	**1**
6(d)	M1 (Moles H_2SO_4 =) 0.0125 (1) M2 0.455 mol / dm^3 (1) based on 6(c)(ii) = 27.5 cm^3	**2**
6(e)	M1 Heat (aqueous sodium sulfate) (1) M2 To crystallisation point /saturation(point) (1) M3 Description of drying the crystals (1)	**3**