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

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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**

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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**

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<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>

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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**

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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**

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