Cambridge International AS & A Level

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Cambridge International Advanced Subsidiary and Advanced Level

CHEMISTRY **9701/52**

Paper 5 Planning, Analysis and Evaluation **May/June 2017**

MARK SCHEME

Maximum Mark: 30

Published

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Question	Answer	Marks
1(a)	Any **two** from Hazard: toxic to aquatic organisms **And** Precaution: do not dispose of (lead and lead compounds) into the water waste / down the drain Or Hazard: may cause long-term damage to aquatic environment **And** Precaution: do not dispose of (lead and lead compounds) into the water waste / down the drain Or Hazard: harmful by inhalation **And** Precaution: carry out in fume cupboard, well-ventilated room Or Hazard: harmful by swallowing **And** Precaution: wear gloves	**2**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td rowspan="3">1(b)</td><td>
<table>
<tr><th>Lead oxide</th><th>mass of lead / g</th><th>mass of oxygen / g</th><th>mass of lead combining with 1.00 g oxygen / g</th></tr>
<tr><td>A</td><td>3.78</td><td>0.27</td><td>14.0</td></tr>
<tr><td>B</td><td>3.36</td><td>0.48</td><td>7.0</td></tr>
<tr><td>C</td><td>4.83</td><td>0.46</td><td>10.5</td></tr>
</table>
</td><td></td></tr>
<tr><td>All values correct in mass of lead and mass of oxygen columns. and shown to two decimal places.</td><td>1</td></tr>
<tr><td>Correct values in the final column to 1 decimal place</td><td>1</td></tr>
<tr><td>1(c)(i)</td><td>2.0; 1.0; 1.5;
OR
4:2:3</td><td>1</td></tr>
<tr><td>1(c)(ii)</td><td>Yes
and
The simple whole number ratio is 4:2:3</td><td>1</td></tr>
<tr><td rowspan="2">1(d)</td><td>(The different) lead oxide(s)</td><td>1</td></tr>
<tr><td>Mass of lead combined with 1 g of oxygen</td><td>1</td></tr>
<tr><td>1(e)(i)</td><td>PbO_2</td><td>1</td></tr>
<tr><td>1(e)(ii)</td><td>Relative formula mass or relative molecular mass / M_r</td><td>1</td></tr>
<tr><td>1(f)</td><td>To prevent oxidation or re-oxidation (of lead)</td><td>1</td></tr>
<tr><td>1(g)</td><td>Re-heat the lead (oxide) and re-weigh until there is no further loss in mass.</td><td>1</td></tr>
<tr><td></td><td>Total:</td><td>12</td></tr>
</table>

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Question	Answer	Marks
2(a)(i)	To calibrate the instrument	**1**
2(a)(ii)	In case some of the light is absorbed by the water / fingerprints / dirt	**1**
2(b)(i)	4.74 g	**1**
2(b)(ii)	Dissolve (4.74 g / answer to 2(b) of) $KMnO_4$ in (a container with) (distilled water) (in less than 1 dm^3 of water)	**1**
	(Transfer / add to) a (1 dm^3) volumetric flask; make to mark (with [distilled] water) (and shake) NOTE: Distilled/deionised/purified water must be mentioned for 2 marks to be awarded.	**1**
2(b)(iii)	The mass of $KMnO_4$ is too small to weigh accurately (on a 2dp balance).	**1**
2(c)	529.5	**1**
2(d)(i)	All points plotted correctly	**1**
	Line of best fit drawn	**1**
2(d)(ii)	The concentration is (directly) proportional to the absorbance,	**1**
	The more ions there are, the more light is absorbed (ora)	**1**
2(d)(iii)	Yes because most of the points lie close to the line.	**1**
2(e)(i)	**22.50** (cm^3) **2.50** (cm^3)	**1**
2(e)(ii)	Burette (with 0.1 cm^3 graduations)	**1**
2(f)(i)	Read value from graph. Expected result 2.50×10^{-4} mol dm^{-3}	**1**
2(f)(ii)	$2.50 \times 10^{-4} \times 54.9 \times (100 / 1000) = 1.37 \times 10^{-3}$ g	**1**

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Question	Answer	Marks
2(g)	$\frac{1.37\times10^{-3}}{1.209}\times100$ = 0.113%	**1**
2(h)	So that any excess oxidising agent will not react with / oxidise the $Fe^{2+}(aq)$	**1**
	Total:	**18**

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