Cambridge International AS & A Level

Cambridge International Examinations
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

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.

Cambridge is publishing the mark schemes for the May/June 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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**

<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>

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**

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**