

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.

© IGCSE is a registered trademark.

This document consists of **5** printed pages.

PUBLISHED

Question	Answer	Marks
1(a)	<p>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</p> <p>Or</p> <p>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</p> <p>Or</p> <p>Hazard: harmful by inhalation And Precaution: carry out in fume cupboard, well-ventilated room</p> <p>Or</p> <p>Hazard: harmful by swallowing And Precaution: wear gloves</p>	2

Question	Answer				Marks																
1(b)	<table border="1" data-bbox="293 229 949 568"> <thead> <tr> <th data-bbox="293 229 465 416">Lead oxide</th> <th data-bbox="465 229 568 416">mass of lead /g</th> <th data-bbox="568 229 734 416">mass of oxygen /g</th> <th data-bbox="734 229 949 416">mass of lead combining with 1.00 g oxygen /g</th> </tr> </thead> <tbody> <tr> <td data-bbox="293 416 465 464">A</td> <td data-bbox="465 416 568 464">3.78</td> <td data-bbox="568 416 734 464">0.27</td> <td data-bbox="734 416 949 464">14.0</td> </tr> <tr> <td data-bbox="293 464 465 512">B</td> <td data-bbox="465 464 568 512">3.36</td> <td data-bbox="568 464 734 512">0.48</td> <td data-bbox="734 464 949 512">7.0</td> </tr> <tr> <td data-bbox="293 512 465 568">C</td> <td data-bbox="465 512 568 568">4.83</td> <td data-bbox="568 512 734 568">0.46</td> <td data-bbox="734 512 949 568">10.5</td> </tr> </tbody> </table>				Lead oxide	mass of lead /g	mass of oxygen /g	mass of lead combining with 1.00 g oxygen /g	A	3.78	0.27	14.0	B	3.36	0.48	7.0	C	4.83	0.46	10.5	
Lead oxide	mass of lead /g	mass of oxygen /g	mass of lead combining with 1.00 g oxygen /g																		
A	3.78	0.27	14.0																		
B	3.36	0.48	7.0																		
C	4.83	0.46	10.5																		
	All values correct in mass of lead and mass of oxygen columns. and shown to two decimal places.				1																
	Correct values in the final column to 1 decimal place				1																
1(c)(i)	2.0; 1.0; 1.5; OR 4:2:3				1																
1(c)(ii)	Yes and The simple whole number ratio is 4:2:3				1																
1(d)	(The different) lead oxide(s)				1																
	Mass of lead combined with 1 g of oxygen				1																
1(e)(i)	PbO ₂				1																
1(e)(ii)	Relative formula mass or relative molecular mass / M _r				1																
1(f)	To prevent oxidation or re-oxidation (of lead)				1																
1(g)	Re-heat the lead (oxide) and re-weigh until there is no further loss in mass.				1																
	Total:				12																

PUBLISHED

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 $2.50 \times 10^{-4} \text{ mol dm}^{-3}$	1
2(f)(ii)	$2.50 \times 10^{-4} \times 54.9 \times (100 / 1000) = 1.37 \times 10^{-3} \text{ g}$	1

PUBLISHED

Question	Answer	Marks
2(g)	$\frac{1.37 \times 10^{-3}}{1.209} \times 100 = 0.113\%$	1
2(h)	So that any excess oxidising agent will not react with / oxidise the Fe ²⁺ (aq)	1
	Total:	18