Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CHEMISTRY **9701/53**

Paper 5 Planning, Analysis and Evaluation **October/November 2016**

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.

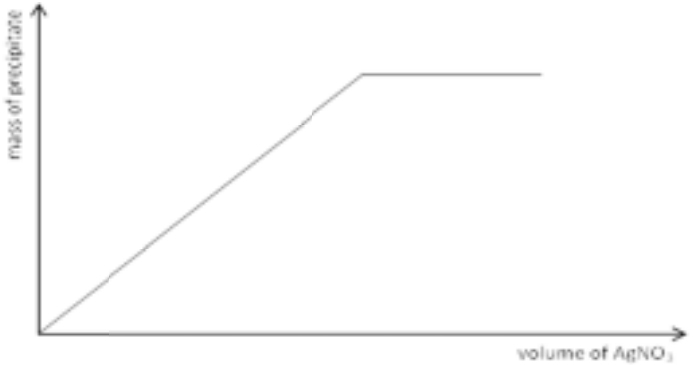
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2016 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

© UCLES 2016

Question	Answer	Mark
1(a)(i)	silver chromate(VI) / silver chromate $2Ag^+ + CrO_4^{2-} \rightarrow Ag_2CrO_4$ OR $2Ag^+ + K_2CrO_4 \rightarrow Ag_2CrO_4 + 2K^+$ OR $2AgNO_3 + K_2CrO_4 \rightarrow Ag_2CrO_4 + 2KNO_3$	1 1 **2**
1(a)(ii)	insoluble / solid barium chromate(VI) / barium chromate would form	1 **1**
1(a)(iii)	insoluble / solid barium sulfate is formed	1 **1**
1(b)	 correctly labelled axes straight line through origin **AND** reaches a plateau	 1 1 **2**
1(c)(i)	Volumetric/graduated flask 250 cm^3 pipette (graduated) 25 cm^3 burette 50 cm^3	 **2**

© UCLES 2016

Question	Answer	Mark
1(c)(ii)	Dissolve / stir / mix known mass / all of hydrated salt in (a container with) (distilled water) (Transfer / add to a) volumetric flask, make to mark (with distilled water) or to the volume of the stated volumetric flask (in **1(c)(i)** or **1(c)(ii)**) NOTE: Water must be mentioned at least once for one mark to be awarded. Distilled/deionised/purified water must be mentioned for 2 marks to be awarded.	1 1 **2**
1(c)(iii)	first = sulfuric acid second = potassium chromate(VI) third = silver nitrate	1 **1**
1(c)(iv)	experiment / titration is repeated to get concordant titre	1 **1**
1(c)(v)	$0.0128 \times 208.3 = 2.67$ g of $BaCl_2$ **AND** $3.13 - 2.67 = 0.46$ g of H_2O **x** = $(0.46 / 18.0) \div 0.0128 = 2$	1 1 **2**

© UCLES 2016

Question	Answer	Mark
1(d)	Potassium chromate (solution) – (health hazard in context of) respiratory irritation **AND** fume cupboard / face / nose / mouth mask ..... **OR** Potassium chromate – (health hazard in context of) skin irritation **AND** (chemical resistant) gloves …… **OR** barium chloride (solid) as toxic **AND** (chemical resistant) gloves / large dilution on disposal …… **OR** Sulfuric acid as irritant / skin irritant **AND** (chemical resistant) gloves	1 **1**
	Total:	**15**

© UCLES 2016

Question	Answer	Mark
2(a)	Column **C** data correct Column **D** data correct and given to 2 dp	1 1 **2**

C	**D**	
$(\alpha - \alpha_\infty)$	$\log_{10}(\alpha - \alpha_\infty)$	time
51.9	1.72	0
41.1	1.61	300
33.3	1.52	600
27.5	1.44	900
22.6	1.35	1200
18.2	1.26	1500
14.4	1.16	1800
11.7	1.07	2100
9.5	0.98	2400
7.5	0.88	2700

© UCLES 2016

Question	Answer	Mark
2(b)(i)	All ten points plotted correctly Best-fit **straight** line drawn	1 1 **2**
2(b)(ii)	(Yes) most of the points are on the line **OR** only a few points are not on the line	1 **1**
2(c)(i)	Co-ordinates read and recorded correctly Correctly calculated value of the gradient given to **3sf** and using the candidate's co-ordinates correctly	1 1 **2**
2(c)(ii)	k = candidate's gradient $\times$ (– 2.30) Correct answer	1 1 **2**
2(d)(i)	Reading / value of α was read / taken / recorded too early	1 **1**
2(d)(ii)	Two co-ordinates on line correctly read and stated **AND** One y value must be half the other $t_{½}$ correctly determined from candidate's co-ordinates values provided $y_1 = y_2 / 2$	1 1 **2**
2(d)(iii)	Correctly calculated value for $k' = \frac{0.693}{t_{\frac{1}{2}}}$	1 **1**

© UCLES 2016

Question	Answer	Mark
2(d)(iv)	Second reaction took place at <u>higher</u> temperature **AND** because *k*' (second *k* value) is larger	1 **1**
2(d)(v)	No **OR** the half-life would not change **AND** half-life is independent of cencentration **OR** the reaction is first order (with respect to sucrose)	1 **1**
	Total:	**15**

© UCLES 2016