

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the October/November 2015 series**9701 CHEMISTRY****9701/36**Paper 3 (Advanced Practical Skills 2),
maximum raw mark 40

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 2015 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.

Page 2	Mark Scheme	Syllabus	Paper
	Cambridge International AS/A Level – October/November 2015	9701	36

Question	Indicative material	Mark	Total
1 (a)	I Constructs a single table for 6 results.	1	[8]
	II Correct headings and units. Volumes/V/vol in cm ³ or /cm ³ or (cm ³), time/t in seconds or /s or (s).	1	
	III All times recorded to the nearest second and all volumes to 0.05 cm ³ .	1	
	IV Four further experiments chosen with intervals not less than 2 cm ³ and no volume less than 6 cm ³ . At least one volume must be less than 10 cm ³ and at least one must be more than 10 cm ³ .	1	
	V Water added to make total volume of FB 1 and water 20 cm ³ in each experiment and no other changes in volume.	1	
	VI Times increase with decrease in volume FB 1 .	1	
	VII and VIII Examiner rounds times to nearest second and calculates (time for expt 2)/(time for expt 1) to 2 dp. Ratio is compared with that of Supervisor. Award marks as follows: VI if ratio within 0.2 of Supervisor. VII if ratio within 0.1 of Supervisor.	1 1	
(b)	(i) number of moles S ₂ O ₃ ²⁻ = 1.2 × 10 ⁻⁴	1	[5]
	(ii) Correctly calculates answer to (i) / 2 = 0.6 × 10 ⁻⁴ and (iii) answer to (ii) × 2 = 1.2 × 10 ⁻⁴ .	1	
	(iv) Correct expression $\frac{1.2 \times 10^{-4}}{0.06} = 2.(0) \times 10^{-3}$	1	
	(v) Rates correctly calculated using $\frac{(\text{c})(\text{iv}) \times 10^6}{t}$	1	
	Units for rate given as mol dm ⁻³ s ⁻¹ and 3 correct columns used.	1	
(c)	I Axes labelled – rate on y-axis and volume or FB 1 / cm ³ on x-axis	1	
	II Uniform scales to use at least half of each axis including 0,0 if point plotted.	1	
	III Correct plotting – all points recorded plotted and within half a small square and within correct small square.	1	

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge International AS/A Level – October/November 2015	9701	36
	IV Draws a line of best fit. (can be straight line or curve). <i>Straight lines must be straight (single line with no kinks, drawn using a ruler) or a smooth curve (gradual change in gradient). Points not on the line must be balanced on either side of the best fit line but any points ringed or labelled as anomalous should be ignored.</i>	1	[4]
(d)	Rate increases as concentration of Fe^{3+} increases Comment on graph as drawn. <i>Possible comments include:</i> <i>The results are consistent since all points are on/near the line.</i> <i>An anomalous point is present/or not present.</i> <i>Would have expected graph to go through 0,0.</i> <i>Straight line shows rate proportional to conc/vol</i>	1 1	[2]
(e)	Alter volume of FB 2 /KI whilst keeping other volume of FB 1 / FeCl_3 constant Add water to keep total volume constant	1 1	[2]
(f)	Modification 1 Reaction time less. (Less accurate since) larger % error (in time). Modification 2 Reaction time stays the same (Less accurate since) greater % error in volume.	1 1 1 1	[4]
(g)	(i) Experiment with shortest reaction time (ii) Correct expression $\frac{0.5 \times 100\%}{\text{smallest reaction time}}$	1 1	[2]
[Total: 27]			

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge International AS/A Level – October/November 2015	9701	36

FB 4 $\text{Cu}(\text{NH}_4)_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$, **FB 5** $\text{Fe}(\text{NH}_4)(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$, **FB 6** $\text{C}_6\text{H}_{12}\text{O}_6$

2 (a) (i)	FB 4	FB 5		
	colour to dark(er)/deep blue	no change / no reaction.	1	
	brown (solution) (+ off-white / beige ppt)	no reaction / no change / no ppt	1	
	blue ppt. insol. in excess	green ppt. insol in excess / goes brown		
	blue ppt. soluble in excess to give dark blue solution	green ppt. insol in excess / goes brown	1	
	white ppt. and insol in HCl / no change	white ppt and insol in HCl / no change	1	
			1	[5]
(ii)	Anion present in both is SO_4^{2-} / sulfate and FB 4 Cu^{2+} / copper(II) and FB 5 Fe^{2+} / iron(II)		1	[1]
(iii)	Heat with (aqueous) sodium hydroxide. Ammonia / gas given off that turns litmus blue		1	
	Cation is NH_4^+ / ammonium		1	[2]
(b) (i)	Manganate (VII) changes from purple to colourless.		1	
	Silver colour / grey ppt / black ppt / silver mirror		1	[2]
(ii)	Aldehyde and / or ketone (both needed) / carbonyl compound / functional group is $\text{C}=\text{O}$.		1	[1]
(iii)	Aldehyde		1	[1]
(iv)	+1 to 0		1	[1]
[Total: 13]				