CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the May/June 2015 series

9701 CHEMISTRY

9701/32 Paper 32 (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 May/June 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.

CAMBRIDGE
International Examinations

Question	Indicative material	Mark	Total
1 (a)	**I** Follows instructions – adds between 13.00 and 13.50 cm^3	1	
	II Initial and final burette readings and titre unambiguously recorded in rough and accurate titrations.	1	
	III Headings and units correct for accurate titration and headings match readings. *Headings: initial / final (burette) reading / volume or Reading / volume at start / finish **and** Volume / **FB** 1 added / used or titre [not "difference"] **and** Units: (cm^3) or / cm^3 or in cm^3 or cm^3 by every entry*	1	
	IV All accurate burette readings (initial and final) recorded to nearest 0.05 cm^3 *Do **not** award this mark if:* *50(.00) is used as an initial burette reading;* *more than one final burette reading is 50.(00);* *any burette reading is greater than 50.(00)*	1	
	V Has two uncorrected, accurate titres within 0.1 cm^3 *Do **not** award this mark if, having performed two titres within 0.1 cm^3, a further titration is performed that is more than 0.1 cm^3 from the closer of the two initial titres unless further titrations within 0.1 cm^3 of any other has also been carried out.* *Do **not** award the mark if any 'accurate' burette readings (apart from initial 0) are given to **zero** dp.*	1	

Examiner rounds all burette readings to the nearest 0.05 cm^3 and checks subtractions. The 'best' titres should be selected using the hierarchy:
two (or more) identical,
then two (or more) within 0.05 cm^3 ,
then two (or more) within 0.1 cm^3, etc.

Examiner to calculate, correct to 2 dp, $\frac{\text{supervisor titre}}{\text{supervisor volume diluted}}$ and $\frac{\text{candidate titre}}{\text{cand vol diluted}}$ and find the difference, δ.

	Award **VI**, **VII** and **VIII** if $\delta \leqslant 0.02$ Award **VI** and **VII** if $0.20 \leqslant \delta \leqslant 0.04$ Award **VI** if $0.40 \leqslant \delta \leqslant 0.06$ *Spread penalty: if the two 'best' titres used by the examiner are more than 0.50 cm^3 apart cancel one of the Q marks.*	1 1 1	[8]

© Cambridge International Examinations 2015

1 (b)	Calculation of mean Candidate must average two (or more) titres that are **all** within $0.20\,cm^3$. Working must be shown or ticks must be put next to the two (or more) accurate readings selected. *The mean should normally be quoted to 2 dp rounded to the nearest 0.01. Example: 26.667 must be rounded to 26.67.* *Two special cases where the mean may not be to 2 dp:* *allow mean to 3 dp only for 0.025 or 0.075, e.g. 26.325;* *allow mean to 1 dp if **all** accurate burette readings were given to 1 dp and the mean is exactly correct, e.g. 26.0 and 26.2 = 26.1 is correct but 26.0 and 26.1 = 26.1 is incorrect.*	1	[1]

Question	Indicative material	Mark	Total
1 (c)(i)(ii)	**I** Uses the expression $\frac{0.100 \times \textbf{(b)}}{1000}$ in step **(i)** **and** use of × ½ in **(ii)**	1	
(iii)	**II** Correctly calculates **(ii)** / 0.025	1	
(iv)	**III** Correctly calculates **(iii)** × (250 / volume diluted)	1	
(v)	**IV** Correctly calculates **(iv)** × (106 / 125) × 100	1	
	V Answers to **(i)** to **(iv)** given to 3 or 4 sf	1	[5]
Qn 1	**Total**	**[14]**	

© Cambridge International Examinations 2015

Question	Indicative material	Mark	Total
2 (a)	Table to include initial and final mass, initial and final temperature, mass added and temperature rise. All with correct units. All masses recorded to the same precision and all temperatures recorded to .0 or .5 °C.	1 1	
	III Award if the difference between candidate and Supervisor is within 4.0 °C **IV** Award if the difference between candidate and Supervisor is within 2.0 °C	1 1	[4]
2 (b) (i)	Correct answer to $4.2 \times 40 \times \Delta T$ Allow answers to 2 – 4 sf	1	
(ii)	Correct answer to **(i)** / 457 000 Allow answers to 2 – 4 sf	1	
(iii)	Correct answer to **(ii)** × (24.3 / mass of mixture) × 100 Allow answers to 2 – 4 sf	1	
(iv)	Heat loss (not significant) **or** non-standard conditions (not significant)	1	[4]
2 (c) (i)	Correct working or answer correct to number of sf shown: (1.0 / temp rise) × 100	1	
(ii)	Reduce the volume of acid to give a greater temperature rise. Make sure that the acid remains in excess.	1 1	[3]
Qn 2	**Total**	**[11]**	

© Cambridge International Examinations 2015

Question	Indicative material	Mark	Total
FB 6 is $NH_4Cl(aq)$ and $Zn(NO_3)_2(aq)$; **FB 7** is 1-iodobutane; **FB 8** is $Na_2CO_3(aq)$; **FB 9** is $H_2SO_4(aq)$			
3 (a) (i)	Clear presentation of results – minimum two tests	1	
	Selects NaOH(aq) and $NH_3(aq)$	1	
	White ppt soluble in excess with both reagents	1	
	Gas / NH_3 turns red litmus blue when warmed with NaOH.	1	
	Zn^{2+} and NH_4^+	1	
(ii)	Warming with NaOH in the presence of NH_4^+ will produce ammonia and so cannot tell if any ammonia is being produced by reduction of the nitrate ions	1	[6]
3 (b) (i)	No reaction on mixing	1	
	Yellow ppt or if observed on mixing then amount of ppt increases.	1	
	Iodine	1	
(ii)	Substitution / hydrolysis	1	[4]
3 (c) (i)	Fizzing	1	
	Limewater turns milky	1	
	White ppt with Ba^{2+}	1	
(ii)	cations: H^+	1	
	anions: CO_3^{2-} and then SO_4^{2-} and / or SO_3^{2-}	1	[5]
Qn 3	**Total**	**[15]**	

© Cambridge International Examinations 2015