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## **CAMBRIDGE INTERNATIONAL EXAMINATIONS**

GCE Advanced Subsidiary Level and GCE Advanced Level

## MARK SCHEME for the May/June 2014 series

## 9185 CHEMISTRY (US)

**9185/35** Paper 35 (Advanced Practical Skills 1),

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 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

Page 2	Mark Scheme	Syllabus	er
	GCE AS/A LEVEL – May/June 2014	9185	100

Qι	estion	Sections	Indicative material	Manne	5
1	(a)	MMO Collection	I Burette readings and correct volume given for dilution and volume between 24.00 and 26.00 cm <sup>3</sup>	1	ridge c
		PDO Layout	II Initial and final readings and titre value given for rough titre and initial and final readings for two (or more) accurate titrations ( $minimum\ of\ 2\times 2\ box$ )	1	
		PDO Recording	<ul> <li>III Appropriate headings and units for accurate titration.</li> <li>and volume FA 3 added recorded for each accurate titre.</li> <li>Headings should match readings.</li> <li>initial/start (burette) reading/volume</li> <li>final/end (burette) reading/volume</li> <li>titre or volume/FA 1 used/added (but not "difference") unit: /cm³ or (cm³) or in cm³ or cm³ for each entry</li> </ul>	1	
			<ul> <li>IV All accurate burette readings recorded to 0.05 cm<sup>3</sup>. The need to record to 0.05 applies only to the burette readings and not to the recorded titres.</li> <li>Do not award this mark if:</li> <li>50(.00) is used as an initial burette reading</li> <li>more than one final burette reading is 50.(00)</li> </ul>	1	
		MMO Decisions	V Has two uncorrected, accurate titres within 0.1 cm <sup>3</sup> Do not consider the rough even if ticked. Do not award this mark if having performed two titres within 0.1 cm <sup>3</sup> a further titration is performed which is more than 0.10 cm <sup>3</sup> from the closer of the initial two titres, unless a further titration, within 0.1 cm <sup>3</sup> of any other titration 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	

Round any burette readings to the nearest 0.05 cm<sup>3</sup>.

Check and correct subtractions in the dilution and titre tables.

Examiner then selects the "best" titre using the hierarchy: two identical; titres within 0.05 cm³; titres within 0.1 cm³; etc.

Candidate scaled titre = Cand vol diluted × Cand mean titre/Sup vol diluted Examiner compares candidate scaled titre with Supervisor's titre.

(a)	MMO Quality	VI, VII and VIII Award VI, VII and VIII for δ ≤ 0.20 cm <sup>3</sup>	3	
		Award <b>VI</b> and <b>VII</b> for $0.20  \text{cm}^3 < \delta \le 0.40  \text{cm}^3$		
		Award <b>VI only</b> for a difference of $0.40 < \delta \le 0.60  \text{cm}^3$ If the "best" titres are $\ge 0.50  \text{cm}^3$ apart cancel one of the Q marks.		[8]

Page 3	Mark Scheme	Syllabus	er
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Question	Sections	Indicative material	Call	8.
(b)	ACE Interpretation	Candidate must average two (or more) titres that are all within 0.20 cm <sup>3</sup> .  Working must be shown or ticks must be put next to the two (or more) accurate readings selected.	1	bridge.
		The mean should normally be quoted to 2 dp rounded to the nearest 0.01.  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 <b>all</b> 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.		
		Note: the candidate's mean will sometimes be marked as correct even if it is different from the mean calculated by the Examiner for the purpose of assessing accuracy.		[1]
(c)	ACE Interpretation	I Correctly evaluates $\frac{0.500 \times \text{vol diluted}}{250}$ in (i)	1	
		II Correctly calculates (i) $\times \frac{\text{(b)}}{1000}$ in (ii)	1	
		III Correctly calculates (ii) ÷ 2 in (iii)	1	
		IV Correctly calculates (iii) $\times \frac{1000}{25}$ in (iv)	1	
	PDO Display	V All answers given to 3 or 4 sf minimum 3 steps attempted to access this mark	1	[5]
(d)	ACE	(i) smallest = 24.70, largest = 24.90	1	
	Interpretation Conclusion	(ii) lower conc <b>FA 3</b> leads to greater titre therefore greater conc. of Ca(OH) <sub>2</sub>	1	[2]
(e)	ACE Conclusion	limewater reacts with carbon dioxide in air	1	[1]
Qn 1	Total	,	[1	7]

Page 4	Mark Scheme	Syllabus
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Que	stion	Sections	Indicative material	M. TI	84.
2	Layout  I Headings with units <b>and</b> three balance readings and two correctly calculated masses of solid are tabulated clearly.  Mass /g, (g), in g, in grams  If units are omitted from the headings then they must appear next to each entry in the table.		1	bridge.	
		MMO Collection	II White solid turns yellow/green-yellow on heating and white/becomes paler on cooling	1	
			mass <b>FA 4</b> ÷ mass loss to 1 dp.  the candidate to 1 dp and calculate difference from Supervisor		
	(a)	MMO Quality	III and IV Award III and IV if δ ≤ 0.5.	1	
			Award <b>IV only</b> if $0.5 < \delta \le 1.0$ .	1	[4]
	(b)	ACE Interpretation	I Correctly calculates mass loss from results in (a) in (i)	1	
			II Correctly calculates $M_r$ : ZnCO <sub>3</sub> = 125.4 and CO <sub>2</sub> = 44(.0) in (ii)	1	
		PDO Display	III Uses $\frac{(i) \times 125.4}{44}$ in (ii) (allow ecf)	1	
			IV Uses $\frac{\text{(ii)} \times 100}{\text{correct mass FA 4}}$ in (iii)	1	[4]
	(c)	ACE Improvement	Heat to constant mass/ use larger mass	1	
		Interpretation	All decomposes/all CO <sub>2</sub> given off smaller % error	1	[2]
Qn 2	2	Total		[1	0]

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Page 5	Mark Scheme	Syllabus
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Question	Sections	Indicative	material	ambridge.	
	<b>FA 5</b> is $ZnCO_3(s) + Al_2(SO_4)_3(s)$ <b>FA 7</b> is $NH_4Cl(s) + NaHCO_3(s)$				
3 (a) (i)	MMO Collection	I Effervesce	Effervescence (and colourless solution)		
(ii)		II White ppt	White ppt with NaOH soluble in excess		
(iii)		III White pp	I White ppt with NH <sub>3</sub> insoluble/partially soluble in excess		
(iv)		IV No react	ion/no change/no ppt	1	
(v)		V White ppremain)	ot (if additional HCI/HNO <sub>3</sub> added then ppt must	1	
(vi)	ACE Conclusion	<b>VI</b> A <i>l</i> <sup>3+</sup>		1	
		VII SO <sub>4</sub> <sup>2-</sup> as	s white ppt with Ba <sup>2+</sup>	1	[7]
(b) (i)	MMO Collection	gentle heat and	I Condensation <b>or</b> sublimation ( <i>allow misty/white fumes</i> ) (on gentle heating) <b>and</b> (gas/NH <sub>3</sub> ) turns (damp) red litmus blue		
(ii)		II White/off-	white/cream ppt soluble in NH <sub>3</sub>	1	
(iii)		III No reacti	III No reaction or white ppt in 1 <sup>st</sup> box (allow no ppt) and effervescence in 2 <sup>nd</sup> box		
	MMO Decisions	IV Uses lim	ewater in either 3 <sup>rd</sup> test or in <b>(a)(i)</b>	1	
(iv)	ACE Conclusion	V and VI Identifies N evidence.	Identifies NH <sub>4</sub> <sup>+</sup> , C <i>l</i> <sup>-</sup> and CO <sub>3</sub> <sup>2-</sup> or SO <sub>3</sub> <sup>2-</sup> with appropriate		
		V only Identifies al	Identifies all three ions without evidence		
			o ions with evidence.		
			ion minimum evidence		
		NH <sub>4</sub> <sup>+</sup> gas turning litmus blue/NH <sub>3</sub> (provided correct litmus result in obs)			
		Cl <sup>-</sup> white ppt with AgNO <sub>3</sub>			
		CO <sub>3</sub> <sup>2-</sup> SO <sub>3</sub> <sup>2-</sup>	(rapid) effervescence with acid white ppt with Ba <sup>2+</sup> and effervescence/ppt dissolves in acid		[6]
Qn 3	Total		·	[13]	
Q.I. U	Total			١.	<u> </u>