CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the October/November 2014 series

9701 CHEMISTRY

9701/31

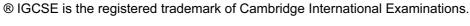
Paper 3 (Advanced Practical Skill 1), maximum raw mark 40

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 October/November 2014 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.





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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge International AS/A Level – October/November 2014	9701	31

Questio	n Indicative material	Mark	Total
1 (a)	I Two balance readings and correct mass of magnesium recorded. Table to show temperature and time. Headings and units – must be temperature /°C, (°C), in °C and time/s, (s), or time in seconds or /min, /minutes, and /g, (g),	1	
	II Thermometer readings to ±0.5 °C (at least 1 ending in .5 or .0) (Minimum 8 readings)	1	
	III All specified readings taken and balance readings to the same number of dp	1	
	Difference between temperature at 2 minutes and highest temperature (i calculated and compared with ΔT of Supervisor.	n table)	
	IV, V and VI ΔT within 10% of Supervisor IVand V ΔT within 15% of Supervisor IV only ΔT within 20% of Supervisor	3	[6]
(b) (i)	·	1	[0]
	II Plotted points should be drawn clearly with a sharp pencil. Points should be plotted to within half a small square and in the correct square for <i>y</i> -axis and on line for <i>x</i> -axis.	1	
(ii) III Correctly extrapolated best fit straight lines drawn up to time 2½ minutes and after 2½ minutes.	1	
(i	i) IV Examiner calculates ∆T from graph and checks answer is within 0.25 °C of candidate's stated answer	1	[4]
(c)	All the magnesium/solid dissolved/disappeared or all solid/Mg has gone/been used up or no solid/Mg left	1	
(i) Correctly calculates $25 \times 4.2 \times \Delta T$	1	
(i	Correctly calculates (ii) ÷ number of moles of magnesium and converts to kJ ($\frac{\text{(ii)} \times 24.3}{1000 \times \text{mass Mg}}$) and final answer to 2–4 sf	1	
	Sign is negative in (c)(iii) and (e)(iv)	1	[4]
(d)	8 readings (in space below printed area) • 4 × balance readings • 2 × initial temp • 2 × highest/max temp with unambiguous headings	1	
	Correctly calculates both masses of Mg and both ΔTs .	1	[2]

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Question	Indicative material	Mark	Total
(e) (i) & (ii)		1	
(iii)	Moles CuSO ₄ = $\frac{25 \times 1}{1000}$ = 0.025	1	
	Moles Mg = $\frac{\text{(ii) or max mass Mg}}{24.3}$ so CuSO ₄ in excess or <0.025	1	
(iv)	Working to calculate ΔH using mean values of mass Mg and ΔT $\left(\frac{\Delta T(\mathbf{i}) \times 25 \times 4.2 \times 24.3}{(\mathbf{i}\mathbf{i}) \times 1000}\right)$ or $\left(\frac{\Delta T(\mathbf{i}) \times 25 \times 4.2}{\text{mol Mg from (iii)} \times 1000}\right)$	1	[4]
(f)	Attempt at use of Hess' law either by cycle or reverse reaction 2	1	
	Correctly calculates ΔH reaction 3 = ΔH reaction 1 – ΔH reaction 2	1	[2]
(g) (i)	Any 2 of Lower ΔH and so higher % error No correction made for loss of heat on cooling Some bubbles/gas/ H_2 in reaction 2 so wrong reaction taking place Not all Mg reacts/reaction does not go to completion in 2 (so not all energy released) Reaction 2 slower so more heat loss	1	
(ii)	No, since (larger volume of solution means) smaller ΔT OR	1	
	Yes, since there would be a smaller T rise so less heat would be lost.		[3]
Qn 1		Total	[25]

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Page 4	Mark Scheme	Syllabus	Paper
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Qι	uestion	Indicative material	Mark	Total
		FA 6 is NaNO ₃ (s); FA 7 is AgNO ₃ (aq); FA 8 is ZnCO ₃ (s)		
2	(a) (i)	Chooses NaOH(aq) (+ heat) (to distinguish NH_4^+ /ammonium) Chooses named (allow name from (ii)) dilute acid/(acidified) KMnO ₄ (to distinguish between NO_2^- /nitrite and NO_3^- /nitrate) 2 ions chosen: NH_4^+ & NO_3^- : NaOH (and warm) NO_2^- & NO_3^- : named (dilute) acid NH_4^+ & NO_2^- : either of the above	1	
	(ii)	Correct obs with relevant tests With NaOH and warming/heating: no ammonia/no change/no reaction With acid(aq): no brown fumes/no change/no reaction 'No observation' is not credited anywhere in the observations.	1	
	(iii)	FA 6 contains NO ₃ ⁻ (with sufficient obs to eliminate other ion(s) given in (i))	1	[5]
	(b)	+ HCl (aq): white ppt	1	
		+ KI: yellow ppt + NH ₃ : no effect/ppt insol	1 1	
		+ glucose: silver mirror/black/(dark) grey ppt	1	[4]
	(c) (i)	(Solid is) yellow when heated Goes white/paler on cooling	1 1	
	(ii)	effervescence/fizzing/rapid bubbling and limewater turns milky	1	
	(iii)	White ppt and soluble in excess NaOH	1	
	(iv)	White ppt and soluble in excess NH ₃	1	
	(v)	lons present: Zn ²⁺ and CO ₃ ²⁻ (from fizz or limewater test correct)	1	[6]
Qn	2		Total	[15]