

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Level

MARK SCHEME for the October/November 2014 series

9701 CHEMISTRY

9701/53

Paper 5 (Planning, Analysis and Evaluation),
maximum raw mark 30

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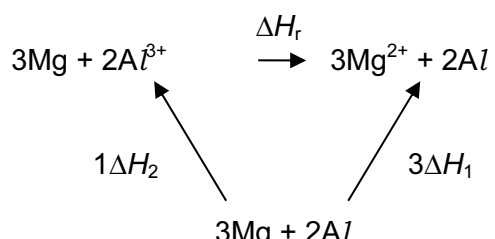
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Page 2	Mark Scheme	Syllabus	Paper
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Question	Expected Answer	Additional Guidance	Mark	
1 (a)	(i) $\text{Mg} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2$		1	
	(ii) $2\text{Al} + 3\text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + 3\text{H}_2$		1	[2]
(b)	(i) The mass of magnesium		1	[1]
	(ii) The temperature change		1	[1]
(c)	(i) 12.35 cm^3 ECF equation in (a)		1	[1]
	(ii) The sulfuric acid must be in excess OR to ensure all the Mg has reacted / disappeared / dissolved / is the limiting reagent		1	[1]
(d)	mol of Al = 0.011 (mol) AND mol of sulfuric acid = 0.0167 (mol)		1	
	Volume of sulfuric acid = 16.67 cm^3		1	[2]
(e) (i)	The volume / mass of sulfuric acid / solution OR a stated volume of sulfuric acid. AND The initial / start temperature (of the acid) AND The final / end temperature (reached by the acid)		1	[1]
(ii)	Insulate (the reaction mixture) OR Stir (the mixture while the reaction is taking place)		1	[1]

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Question	Expected Answer	Additional Guidance	Mark	
(iii)	Calculate the heat produced in the reaction using (Q=) mc ΔT Convert to 1 mol		1 1	[2]
(f)	$3\text{Mg} + 2\text{Al}^{3+} \rightarrow 3\text{Mg}^{2+} + 2\text{Al}$ $(\Delta H_r =) 3\Delta H_1 - 1\Delta H_2$ Or a suitable Hess' Law cycle  $\Delta H_r/3$		1 1 1	[3]

Page 4	Mark Scheme	Syllabus	Paper
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Question	Expected Answer	Additional Guidance	Mark	
2 (a)	(i) $\text{Ni}^{2+}(\text{aq}) + 2\text{IO}_3^{-}(\text{aq}) \rightarrow \text{Ni}(\text{IO}_3)_2(\text{s})$		1	[1]
	(ii) 0.1000		1	[1]
	(iii) More precipitate will form		1	[1]
(b) (i)	All points plotted correctly		1	[2]
	Straight line drawn through the origin up to at least exp 7. (If all points do not lie on the line then the net deviation of the non-anomalous points on each side of the best fit line must be approximately the same.)		1	
(ii)	Points at 0.0300 mol and 0.0500 mol		1	[1]
(iii)	Loss of precipitate during transfer to filter OR Precipitate not dry OR Not weighing to constant mass OR Precipitate contains ionic materials not removed		1	[1]
(iv)	Point at 0.1000 lies on the extrapolated drawn line of best fit.		1	[2]
	Point at 0.1200 either at the same value as 0.1000 or slightly higher value		1	
(c) (i)	8.174 g		1	[1]

Page 5	Mark Scheme	Syllabus	Paper
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Question	Expected Answer	Additional Guidance	Mark	
(ii)	0.254 g (from c(i) – 7.92)		1	[3]
	0.000621 (mol)		1	
	$\text{IO}_3^- = 0.00124$ (mol)		1	
(iii)	$[\text{Ni}^{2+}] = 0.306$ AND $[\text{IO}_3^-] = 0.0124$ ECF		1	[2]
	4.71×10^{-5}		1	