

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International Advanced Level

## **MARK SCHEME for the May/June 2015 series**

### **9701 CHEMISTRY**

**9701/53**

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

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Page 2	Mark Scheme	Syllabus	Paper
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Question	Statement	Expected Answer	Mark
1 (a) (i)	M10	$\text{HCOO}^-(\text{aq}) \longrightarrow \text{CO}_2(\text{g}) + \text{H}^+(\text{aq}) + 2\text{e}^-$ $\text{MnO}_4^-(\text{aq}) + 8\text{H}^+(\text{aq}) + 5\text{e}^- \longrightarrow \text{Mn}^{2+}(\text{aq}) + 4\text{H}_2\text{O}(\text{l})$	[1] [1]
(ii)	M6	Magnesium methanoate is $1.312 \text{ mol dm}^{-3}$  $[\text{HCOO}^-(\text{aq})] = 2.624 \text{ mol dm}^{-3}$	[1]  [1]
(iii)	M6	Use <u>volumetric apparatus</u> (to measure $5.0 \text{ cm}^3$ / saturated (magnesium) methanoate solution).  Make (the above) up to the mark (with water) in a $250 \text{ cm}^3$ volumetric / graduated flask	[1]  [1]
(iv)	M3/P4	$\text{H}^+$ is needed for the reaction with manganite  Provided the acid is in excess / sufficient / enough, the volume does not matter	[1]  [1]
(v)	M5	A <b>pale</b> pink colour	[1]
(vi)	M10	$0.051 \text{ mol dm}^{-3}$	[1]
(vii)	M10	$1.28 \text{ mol dm}^{-3}$	[1]

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Question	Statement	Expected Answer	Mark
(b)	P1/P2	(Independent) Temperature  (Dependent) Concentration of magnesium methanoate	[1]
(c)	P3	$\Delta H$ is positive	[1]
		(An increase in temperature) will favour / promote / increase / a movement in the direction of the endothermic change / reaction	[1]
(d)	P3	<b>Precipitate is formed</b> / barium sulfate is <b>insoluble</b> / <b>insoluble product</b>	[1]
			<b>[15]</b>
2 (a) (i)	D1	$K_c = \frac{[\text{HI}]^2}{[\text{H}_2][\text{I}_2]}$	[1]
(ii)	D1	$K_c = \frac{4y^2}{(a - y)^2}$	[1]



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Question	Statement	Expected Answer	Mark
(c) (i)	D3/C1	Co-ordinates read correctly from the line	[1]
		Slope of the graph calculated correctly and given to <b>three significant figures</b> with no units.	[1]
(ii)	D3/C1	Uses $\frac{\sqrt{K_c}}{2 + \sqrt{K_c}}$ = gradient (value or y/a) and provides working	[1]
		Gives value of $K_c$	[1]
(d)	P4	The hydrogen with air / oxygen is explosive at 760K / raised temperature	[1]
(e)	E4	Faster reaction / increased rate	[1]
		The value of $K_c$ would be unaffected	[1]
(f) (i)	E4/C2	The line drawn on the graph has a less steep gradient	[1]
(ii)		The equilibrium constant will be smaller	[1]
			[15]