

MARK SCHEME for the May/June 2012 question paper
for the guidance of teachers

9701 CHEMISTRY

9701/31

Paper 31 (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 must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

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Question	Sections	Indicative material	Mark
(d)	PDO layout	<p>I Rate on y-axis and volume on x-axis. Axes clearly labelled (ignore units)</p> <p>II Linear scale chosen to use at least half of each axis (need not include 0, 0) If no point at 0, 0 cannot count for > half.</p> <p>III Plotting of points. Minimum of 3 readings.</p> <p>IV Draws a line of best fit. Minimum 4 readings including 0, 0 (if plotted).</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>[4]</p>
(e)	ACE conclusion	Rate is proportional to peroxodisulfate concentration Rate increases as concentration (volume) increases would score one	<p>2</p> <p>[2]</p>
(f)	ACE interpretation	<p>(i) correctly calculates $(0.5 / \text{time from Expt 1}) \times 100$. Minimum of 2 s.f.</p> <p>(ii) $\frac{\text{ans (b)(iii)}}{\text{Expt 1 time} + 0.5} \times 10^6 \text{ mol dm}^{-3} \text{ s}^{-1}$ or Rate– (% from (i) \times rate)</p> <p>(iii) Any reasonable suggestion e.g. difficult to judge colour change / measurement of volumes / variation in T</p>	<p>1</p> <p>1</p> <p>1</p>
	ACE improvement	use of colorimeter / burettes for all volumes / (thermostatic) waterbath. Not air conditioning.	<p>1</p> <p>[4]</p>
(g)	ACE conclusion	<p>(ii) Thiosulfate concentration / number moles / volume is doubled (1) Time is longer/ reaction is slower with more thiosulfate (1)</p>	<p>2</p> <p>[2]</p>
			[Total: 26]

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Question	Sections	Indicative material			Mark
FA 5 = CuCl ₂ ; FA 6 = NaOH; FA 7 = Pb(NO ₃) ₂ ; FA 8 = K ₂ CrO ₄ ; FA 9 = MgSO ₄					
2 (a)	MMO collection	Blue ppt insol in excess (1) Not 'dark blue'	White ppt (1) Ignore 'excess'. White ppt soluble in excess (1)	Yellow / brown / greenish-brown ppt (1) Not 'orange, red, red / brown' Ignore excess. No reaction / yellow solution and yellow ppt soluble in excess CONs ppt (1)	[5]
(b)	ACE conclusion	Cu ²⁺ in FA 5 AND CrO ₄ ²⁻ in FA 8 Pb ²⁺ in FA 7 AND OH ⁻ in FA 6 Cl ⁻ in FA 5			1 1 1 [3]
(c)	MMO decision MMO decision PDO recording MMO collection MMO collection ACE conclusion	I Add Pb (NO ₃) ₂ or BaCl ₂ or Ba(NO ₃) ₂ II Add HNO ₃ or HCl III Presents observations in a single table – no extra reagents. Must be > 2 'boxes' IV White ppt V No SO ₂ evolved or ppt insoluble VI sulfate			1 1 1 1 1 [6]
	[Total: 14]				