

Cambridge International Examinations Cambridge International Advanced Subsidiary and Advanced Level

## CHEMISTRY

9701/51 May/June 2017

Paper 5 Planning, Analysis and Evaluation MARK SCHEME Maximum Mark: 30

Published

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## Cambridge International AS/A Level – Mark Scheme PUBLISHED

Question	Answer	Marks
1(a)	diagram of a labelled insulated container containing a liquid	1
	labelled timing device and a labelled thermometer in / touching the liquid	1
1(b)	to ensure temperature of water / experiment / apparatus is at room temperature / constant temperature	1
1(c)	the (anhydrous) calcium chloride is added at this point	1
1(d)	not all the CaC $l_2$ has dissolved (in the first minute) OR dissolving / reaction was not complete	1
1(e)	the cooling curve has a straight line of best fit that extrapolates to 3.0 minutes (or beyond) AND a straight line connecting all the points from 0–2.5 minutes that extrapolates to 3.0 minutes (or beyond)	1
	theoretical temperature rise to 1dp	1
1(f)	8.5 min AND not enough time to reach solution temperature OR it takes time for the thermometer to reach equilibrium with the water temperature	1
1(g)	ensure uniformity of heating (of solution)	1
1(h)	wear gloves OR wear (face) mask	1

## Cambridge International AS/A Level – Mark Scheme PUBLISHED

Question	Answer	Marks		
1(i)	75.0 × 4.18 × 30.0 = 9405 (J) OR 9.405 kJ	1		
	$(1 \text{ mol of } CaC l_2 = 111.1 \text{ g})$	1		
	Mass CaC $l_2$ required = $\frac{9.405}{82.5} \times 111.1 = 12.7$ g			
	Total:	12		

Question	Answer	Marks
2(a)(i)	points plotted correctly from table	1
	line through origin	1
2(a)(ii)	point at 0.045 g cm <sup>-3</sup>	1
2(a)(iii)	two sets of coordinates shown.	1
	gradient correctly calculated expected value = 66–67(°)	1
	value must be to <b>2 dp</b>	
2(b)(i)	0.0750×250 = <b>18.75</b> (g)	1
2(b)(ii)	dissolve the sucrose / mass of sucrose given in <b>2(b)(i)</b> / weighed mass in a stated volume of (distilled) water, less than 250 cm <sup>3</sup> , or if not stated but then later made up to 250 cm <sup>3</sup> / up to the mark	1
	transfer solution to (a 250 cm <sup>3</sup> ) volumetric flask AND Make up the solution to the mark / flask volume with (distilled) water	1

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## Cambridge International AS/A Level – Mark Scheme PUBLISHED

PMT

Question	Answer	Marks
2(c)(i)	$\left(\frac{0.0350}{0.0750} \times 15.00 = 7.00 \text{ cm}^3\right)$ Volume of standard solution = <b>7.00</b> (cm <sup>3</sup> ) Volume of distilled water = <b>8.00</b> (cm <sup>3</sup> )	1
2(c)(ii)	burette / graduated pipette	1
2(c)(iii)	solution was more dilute than expected	1
2(d)	3.75 correctly read off graph (0.056–0.057)(g cm <sup>-3</sup> ) or correctly calculated from $3.75 = 2(a)(iii) \times concentration$	1
	conc of sucrose = $(56-57)(g dm^{-3})$ or multiplying a concentration by 1000 correctly	1
	conc of sucrose = $(0.164-0.167)$ (mol dm <sup>-3</sup> ) or dividing a concentration by M <sub>r</sub> /(342) correctly	1
2(e)	wash out with small volume of solution of concentration to be used	1
2(f)	predicted value: (+)10.10 / 10.1 or twice value at 0.075 taken from graph	1
	explanation: (The plane polarised light encounters) more (twice) molecules / moles / amount of sucrose	1
2(g)	To calibrate the instrument / to set the polarimeter to 0 degrees	1
	Total:	18