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**CHEMISTRY**

**9791/04**

Paper 4 Practical

**May/June 2016**

**MARK SCHEME**

Maximum Mark: 40

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**Published**

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.

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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge Pre-U – May/June 2016	9791	04

Mark schemes will use these abbreviations:

;	separates marking points
/	alternatives
<b>ORA</b>	or reverse argument
<b>ALLOW</b>	for a non-ideal but allowable alternative valid point
<b>NOT</b>	answer is not credited
<u>underline</u>	actual word underlined must be used by candidate (grammatical variants excepted)
(xxx)	wording in brackets is for the clarity of the mark scheme but is not required
<b>max</b>	indicates the maximum number of marks that can be given
<b>+</b>	or <b>AND</b> statements on both sides of the <b>+</b> or <b>AND</b> are needed for that mark
<b>ECF</b>	error carried forward
<b>IGNORE</b>	for an answer that is not creditworthy but does not invalidate any additional creditworthy response

<b>Page 3</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge Pre-U – May/June 2016</b>	<b>9791</b>	<b>04</b>

<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>
1(a)	<b>I</b> All 6 masses recorded (1) <b>II</b> All 4 measured masses have appropriate headings and units: /g or (g) or g by each entry (1) <b>III</b> All 4 measured masses to the same number of dp (at least 2 dp) (1) <b>IV</b> Calculates correctly mass of <b>FA 1</b> added and mass of CO <sub>2</sub> evolved (1) <b>V</b> and <b>VI</b> Compare corrected mass of <b>FA 1</b> /corrected mass of CO <sub>2</sub> with supervisor value. Award <b>V</b> and <b>VI</b> if $\delta \leq 0.20$ (2) <b>OR</b> Award <b>V</b> $0.20 < \delta \leq 0.40$ (1)	<b>6</b>
1(b)(i)	Calculates correctly the moles of CO <sub>2</sub> (min of 2 sf) (1)	<b>4</b>
1(b)(ii)	Calculates correctly ans <b>(i)</b> $\times 84.3$ (1)	
1(b)(iii)	Shows use of ans <b>(ii)</b> / mass of <b>FA 1</b> $\times 100$ (1)	
1(b)(iv)	The other components do no liberate a gas on reaction with acid (1) <b>Do not allow</b> other components do not react with acid	
1(c)(i)	There was not enough acid to react with all the magnesium carbonate (1)	<b>2</b>
1(c)(ii)	No, as the mass of the acid is measured (1)	

<b>Page 4</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge Pre-U – May/June 2016</b>	<b>9791</b>	<b>04</b>

<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>
2(a)	<p><b>I</b> Tabulates initial burette readings, final burette readings and volume of <b>FA 3</b> added (1)</p> <p><b>II</b> Appropriate headings and units for titration results (1)</p> <p><b>III</b> All accurate burette readings and the volumes of <b>FA 3</b> added are given to the nearest 0.05 cm<sup>3</sup> (1)</p> <p><b>IV</b> Two or more uncorrected accurate titres within 0.20 cm<sup>3</sup> (1)</p> <p><b>V</b> and <b>VI</b> Examiner calculates  <math>\delta = [\text{supervisor value} - \text{corrected mean titre}]</math></p> <p>Award <b>V</b> and <b>VI</b> if <math>\delta \leq 0.20</math> (2)  <b>OR</b> Award <b>V</b> only if <math>0.20 \leq \delta \leq 0.40</math> (1)</p>	<b>6</b>
2(b)	Selects titres within 0.20 cm <sup>3</sup> , calculates the correct mean and gives answer to the same number of dp as the most precise burette reading (1)	<b>1</b>
2(c)(i),(ii),(iv)	<p><math>2.5 \times 10^{-3}</math> given as the answer to both <b>(i)</b> and <b>(ii)</b>  <b>AND</b>  0.500 given as answer to <b>(iv)</b> (1)</p>	<b>5</b>
2(c)(iii)	Shows use of ans <b>(ii)</b> / value <b>(b)</b> $\times 1000$ (1)	
2(c)(v),(vi)	<p>Calculates correctly <math>1(\mathbf{b})(\mathbf{iii}) / 100 \times 18</math>  <b>AND</b>  Calculates correctly <math>2 \times \text{ans } (\mathbf{v}) / 84.3</math> (1)</p>	
2(c)(vii)	Calculates correctly ans <b>(iv)</b> – ans <b>(iii)</b> – ans <b>(vi)</b> (1)	
2(c)(viii)	Calculates correctly ans <b>(vii)</b> / $2 \times 58.3 / 18 \times 100$ (1)	

<b>Page 5</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge Pre-U – May/June 2016</b>	<b>9791</b>	<b>04</b>

<b>Question</b>	<b>Expected Answer</b>	<b>Mark</b>
	<b>FA 5 is <math>\text{NaNO}_2</math> FA 6 is <b>KI</b> FA 7 is <math>\text{CuSO}_4</math></b>	
3(a)(i)	Fizzing and brown gas (1)	<b>4</b>
3(a)(ii)	Decolourises (1)	
3(a)(iii)	Yellow / red / brown (solution) formed on adding drop of acid (1)	
3(a)(iii)	Turns blue-black on adding starch (1)	
3(a)(iv)	Uses $\text{NaOH}/\text{Al}$ and warm (1) Gas evolved turns damp red litmus blue (1)	<b>2</b>
3(a)(v)	Uses silver nitrate (1) Yellow ppt (1)	<b>2</b>
3(a)(vi)	<b>FA 5</b> is $\text{NO}_2^-$ (1) <b>FA 6</b> is $\text{I}^-$ (1)	<b>2</b>
3(b)(i)	Blue ppt (1)	<b>4</b>
3(b)(i)	Dissolves in excess to give a dark blue solution (1)	
3(b)(ii)	Green solution (1)	
3(b)(ii)	Turns to blue solution (1)	
3(b)(iii)	$\text{Cu}^{2+}$ (1)	<b>1</b>
3(b)(iv)	Nitrite acts as a ligand, adding acid destroys nitrite ion (1)	<b>1</b>