## MARK SCHEME for the May/June 2011 question paper

## for the guidance of teachers

## 0654 CO-ORDINATED SCIENCES

0654/61 Paper 6 (Alternative to Practical), maximum raw mark 60

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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	Page 2		Mark Scheme: Teachers' version	Syllabus	Paper
			IGCSE – May/June 2011	0654	61
1	(a) (i)	93, 86, 31, 27 ;; (all 4 correct = 2 marks, 3 correct = 1 mark)			[2]
	(ii)	yes,	similar repeats <b>OR</b> no, repeats too different ;		[1]
	(iii)	1 ma 89.5 29 ;	ark for a correct mean formula (e.g. 93 + 86/2) ; ;		[3]
	(iv)	inha inha	led air longer time (than exhaled) ; led has more oxygen ;		[2]
	(v)	( <b>B</b> c high from	loudy ( <b>A</b> not)) ler CO <sub>2</sub> ; n respiration ;		[2] [Total: 10]
2	(a) (i)	0.2,	0.3, 0.4 (all 3 = 1 mark) ;		[1]
	(ii)	50, 6	68 (both required) ;		[1]
	(iii)	labe corre strai	lled axes and sensible scales ; ect points ; ight line through origin ;		[3]
	(iv)	prop (due	oortional / linear ; e to) straight line (graph) ;		[2]
	(v)	from <u>clea</u>	n graph (42mm)+/- 1 ; <u>r</u> indication on graph ;		[2]
	(b)		;		[1]

[Total: 10]

IGCSE - May/June 2011 0654 61 3 (a) (i) (damp) (red) litmus ; turns blue ; (ii) ammonium (ion) ; (b) (i) iron <sup>3+</sup> /iron(III) / Fe <sup>3+</sup> (not iron <sup>2+</sup> etc.) ; (ii) (acidified) silver nitrate (solution) ; white ppt. if positive / Cl present ; no change if negative ; (iii) sulfate (ion) ; (iv) to remove / dissolve any carbonate (ions present) ; (c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion) ; (c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion) ; (iii) $\frac{\text{temperature } 10 ^{\circ}\text{C}$ volume = 25 cm <sup>3</sup> ; at temperature 40 $^{\circ}\text{C}$ volume = 61 cm <sup>3</sup> ; (ii) $\frac{\text{temperature } increase in volume of rate of increase in rolume cm3 / min (v-25) / 30 10 0 0 20 6 0.2(0) 30 22 0.73 40 36 1.2(0) 50 29 0.97 60 0 0 constant do the second data for the second $	Page 3	Mark Scheme: Teachers' version Syllabus			us Paper	
<ul> <li>(a) (i) (damp) (red) litmus ; turns blue ;</li> <li>(ii) ammonium (ion) ;</li> <li>(b) (i) iron<sup>3+</sup> /iron(III) / Fe<sup>3+</sup> (not iron<sup>2+</sup> etc.) ;</li> <li>(ii) (acidified) silver nitrate (solution) ; white ppt. if positive / C1 present ; no change if negative ;</li> <li>(iii) sulfate (ion) ;</li> <li>(iv) to remove / dissolve any carbonate (ions present) ;</li> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion) ;</li> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion) ;</li> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion) ;</li> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion) ;</li> <li>(ii) temperature 10 °C volume = 25 cm<sup>3</sup> ; at temperature 40 °C volume = 61 cm<sup>3</sup> ;</li> <li>(ii) temperature increase in volume of volume cm<sup>3</sup>/min (v-25)/30 10 0 0</li> <li>10 0 0</li> <li>20 6 0.2(0) 30 22 0.73 40 36 1.2(0) 50 29 0.97 60 0</li> <li>column 2 correctly completed ;;</li> <li>(iii) column 3 correctly completed ;;</li> </ul>			IGC	SE – May/June 2011	0654	61
<ul> <li>(ii) ammonium (ion);</li> <li>(b) (i) iron<sup>3+</sup>/iron(III)/Fe<sup>3+</sup> (not iron<sup>2+</sup> etc.);</li> <li>(ii) (acidified) silver nitrate (solution); white ppt. if positive / CI present; no change if negative;</li> <li>(iii) sulfate (ion);</li> <li>(iv) to remove / dissolve any carbonate (ions present);</li> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion);</li> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion);</li> <li>(d) (i) at temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</li> <li>(ii) <u>temperature 10 °C volume = 61 cm<sup>3</sup>;</u></li> <li>(iii) <u>temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</u></li> <li>(iv) <u>temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</u></li> <li>(iii) <u>temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</u></li> <li>(iv) <u>temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</u></li> <li>(iii) <u>temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</u></li> <li>(iii) <u>temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</u></li> <li>(iii) <u>temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</u></li> <li>(iii) <u>temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</u></li> </ul>	(a) (i)	(dan turns	[2			
<ul> <li>(b) (i) iron<sup>3+</sup> / iron(III) / Fe<sup>3+</sup> (not iron<sup>2+</sup> etc.);</li> <li>(ii) (acidified) silver nitrate (solution); white ppt. if positive / <i>CI</i> present; no change if negative;</li> <li>(iii) sulfate (ion);</li> <li>(iv) to remove / dissolve any carbonate (ions present);</li> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion);</li> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion);</li> <li>(a) (i) at temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</li> <li>(ii) temperature increase in volume of volume cm<sup>3</sup>/min (v-25)/30 10 0 0 10 0 10 0 10 10 0 0 10 10 0 0 10 1</li></ul>	(ii)	amm	nonium (ion) ;			[1
<ul> <li>(ii) (acidified) silver nitrate (solution); white ppt. if positive / Cl present; no change if negative;</li> <li>(iii) sulfate (ion);</li> <li>(iv) to remove / dissolve any carbonate (ions present);</li> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion);</li> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion);</li> <li>(a) (i) at temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</li> <li>(ii) temperature increase in volume of rate of increase in volume cm<sup>3</sup> / min (v-25) / cm<sup>3</sup> (v-25) / 30</li> <li>10 0 0</li> <li>20 6 0.2(0)</li> <li>30 22 0.73</li> <li>40 36 1.2(0)</li> <li>50 29 0.97</li> <li>60 0 0</li> <li>column 2 correctly completed ;;</li> <li>(iii) column 3 correctly completed ;;</li> </ul>	(b) (i)	iron <sup>3</sup>	<sup>++</sup> / iron(III) / Fe <sup>3+</sup> (	( <b>not</b> iron <sup>2+</sup> etc.) ;		[1
no change if negative ; (iii) sulfate (ion) ; (iv) to remove / dissolve any carbonate (ions present) ; (c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion) ; (c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion) ; (i) [Tota (a) (i) at temperature 10 °C volume = $25 \text{ cm}^3$ ; at temperature $40 ^{\circ}$ C volume = $61 \text{ cm}^3$ ; (ii) [temperature increase in volume of rate of increase in volume cm <sup>3</sup> /min (v-25)/30] 10 0 0 0 20 6 0.2(0) 30 22 0.73 40 36 1.2(0) 50 29 0.97 60 0 0 column 2 correctly completed ;; (iii) column 3 correctly completed ;;	(ii)	(acio white	lified) silver nitrat e ppt. if positive /	e (solution) ; C <i>l</i> present ;		
(iii) sulfate (ion) ; (iv) to remove / dissolve any carbonate (ions present) ; (c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion) ; (a) (i) at temperature 10 °C volume = $25 \text{ cm}^3$ ; at temperature 40 °C volume = $61 \text{ cm}^3$ ; (ii) $\frac{\text{temperature increase in volume of rate of increase in volume cm}^3/\text{min}}{(v-25)/30}$ $\frac{10  0}{20  6} \qquad 0.2(0)$ $\frac{30  22 \qquad 0.73}{40 \qquad 36 \qquad 1.2(0)}$ $\frac{50  29 \qquad 0.97}{60 \qquad 0}$ $\text{column 2 correctly completed ;;}$ (iii) column 3 correctly completed ;;		no c	hange if negative	• ,		[3
(iv) to remove / dissolve any carbonate (ions present) ; (c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion) ; [Tota (a) (i) at temperature 10 °C volume = $25 \text{ cm}^3$ ; at temperature 40 °C volume = $61 \text{ cm}^3$ ; (ii) $\frac{\text{temperature increase in volume of rate of increase in volume cm}^3/\text{min}_{(v-25)/30}}{10 0 0}$ $\frac{10 0 0}{20 6} 0.2(0)$ $\frac{30 22 0.73}{40 36} 1.2(0)}{50 29 0.97}$ $\frac{60 0}{60 0} 0$ column 2 correctly completed ;; (ii) column 3 correctly completed ;;	(iii)	sulfa	ite (ion) ;			[1
<ul> <li>(c) iron(III) ammonium sulfate (allow ecf but must be 2 cations and 1 anion);</li> <li>[Total</li> <li>(a) (i) at temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</li> <li>(ii) <u>temperature increase in volume of rate of increase in volume cm<sup>3</sup>/min (v-25)/30                                     </u></li></ul>	(iv)	to re	move / dissolve a	ny carbonate (ions prese	nt) ;	[1
[Tota (a) (i) at temperature 10 °C volume = 25 cm <sup>3</sup> ; at temperature 40 °C volume = 61 cm <sup>3</sup> ; (ii) <u>temperature increase in volume of rate of increase in volume cm<sup>3</sup>/min (v-25)/cm<sup>3</sup> (v-25)/30 10 0 0 0 20 6 0.2(0) 30 22 0.73 40 36 1.2(0) 50 29 0.97 60 0 0 0 column 2 correctly completed ;; (ii) column 3 correctly completed ;;</u>	<b>(c)</b> iron	n(III) a	n); [1			
<ul> <li>(a) (i) at temperature 10 °C volume = 25 cm<sup>3</sup>; at temperature 40 °C volume = 61 cm<sup>3</sup>;</li> <li>(ii) <u>temperature increase in volume of volume cm<sup>3</sup>/min (v-25)/30</u></li> <li>10 0 0 0</li> <li>20 6 0.2(0)</li> <li>30 22 0.73</li> <li>40 36 1.2(0)</li> <li>50 29 0.97</li> <li>60 0 0</li> <li>column 2 correctly completed ;;</li> <li>(ii) column 3 correctly completed ;;</li> </ul>						[Total: 10
10       0       0         20       6       0.2(0)         30       22       0.73         40       36       1.2(0)         50       29       0.97         60       0       0         column 2 correctly completed ;;         (iii) column 3 correctly completed ;;	(ii)	atte	temperature 40 °C	increase in volume of dough	rate of increase in volume cm <sup>3</sup> / mir	ل ۱
10       0       0         20       6       0.2(0)         30       22       0.73         40       36       1.2(0)         50       29       0.97         60       0       0         column 2 correctly completed ;;         (iii) column 3 correctly completed ;;			10	(v-25)7 cm	(v-23)730 0	
20       0       0.20         30       22       0.73         40       36       1.2(0)         50       29       0.97         60       0       0         column 2 correctly completed ;;       (iii)         column 3 correctly completed ;;			20	6	0.2(0)	
40       36       1.2(0)         50       29       0.97         60       0       0         column 2 correctly completed ;;         (iii)       column 3 correctly completed ;;			30	22	0.73	
50         29         0.97           60         0         0           column 2 correctly completed ;;         (iii)         column 3 correctly completed ;;			40	36	1.2(0)	
60     0       column 2 correctly completed ;;       (iii) column 3 correctly completed ;;			50	29	0.97	
column 2 correctly completed ;; (iii) column 3 correctly completed ;;			60	0	0	
(iii) column 3 correctly completed ;;		colu	[2			
	(iii)	colu	mn 3 correctly co	mpleted ;;		[2
<b>(b)</b> 40 °C ; (ecf)	<b>(b)</b> 40°	°C ; (e	ecf)			[1
		.h.c.t.		46 4 -		•

(d) 20 to 30 °C (increasing rate of reaction) enzyme gaining (kinetic) energy;
 40 to 60 °C (decreasing rate of reaction) because enzymes are becoming denatured / destroyed;

[2]

## [Total: 10]

Page 4			Mark Scheme: Teachers' version	Syllabus	Paper	
				IGCSE – May/June 2011	0654	61
5	(a) (	(i) 5 5 (ii) 1 2	51.5 54.8 1.5 ; 4.8 ;	(+/- 0.1) ; (+/- 0.1) ; (ecf)		[2]
	(b)	31.3 42.8	- 7 7			[2]
	(c)	<b>A</b> : 49 <b>B</b> : 31 <b>C</b> : 42	9.8 ÷ 1.3 ÷ 2.8 ÷	4.4 = <b>11.3</b> ; 1.5 = <b>20.9</b> ; 4.8 = <b>8.9</b> ; (answers = 1 mark each) (ecf)		[3]
	(d)	<b>A</b> =	ead	$\mathbf{B} = \text{gold } \mathbf{C} = \text{copper}; (\text{ecf})$		[1]
						[Total: 10]
6	(a)	(i) 7 3	73; 39;			[2]
	(	(ii) a 2	at lea 2 Iab	ast 5 points correctly plotted for each oxide ;; elled curves / lines ;; (allow 1 mark if lines not label	led)	[4]
	(i	iii) M	MnO	<sub>2</sub> (no mark), more gas given off / gas given off faste	r / graph steeper ;	[1]
	(b) spatula measures inaccurate / delay in putting stopper back in / delay in starting stopclock ;					]
	(c)	retrie use a (note	eve / agair e 'use	wash catalyst ; n/compare mass before and after ; e again', 'on its own' = no marks)		[2]