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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 question paper for the guidance of teachers

0654 CO-ORDINATED SCIENCES

0654/51 Paper 5 (Practical), maximum raw mark 45

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1 **(a)** **(i)** splint relights / splint glows brighter ;
oxygen / O_2 ; (second mark tied to a correct observation)

(ii) 3 reasonably similar readings for fresh yeast **B**, **C** and **D** ;
clearly in seconds ; [2]

(iii) correct value for (**B** + **C** + **D**) ÷ 3 to a minimum of 1 decimal place unless it is exactly a whole number ; [1]

(b) **(i)** 'no reaction' recorded for **E** in Table 1.1 ; [1]

(ii) fresh yeast faster reaction / fresh yeast worked (or reverse statement) ;
enzymes (or yeast) denatured (killed / destroyed / made inactive) by boiling ; [2]

(c) **(i)** *yes*: similar readings ;
OR
no: different values / too few repeats / difficult to time end point (if this response is seen here it cannot be credited in **(c)** **(ii)** as well) / loss of yeast down side of tube ;
[max 1]

(ii) uneven concentration of yeast ;
timing error ;
judgement of foam reaching the line ;
not all yeast reaches the peroxide ;
detergent not controlled ;
concentration of hydrogen peroxide ;
accuracy of measuring (must be accompanied by reference to scale) ; [max 2]

(d) 2 or more different temperatures ;
controlled amount of enzyme (mass / amount / size / volume) ;
repeats ;
method of measuring rate (volume of oxygen in a time / height of foam in a time) ;
control of pH ;
same peroxide concentration ;
water baths used ; [max 4]

[Total: 15]

2 **(a)**

compound changes	name and formula	time / s	colour
A	zinc carbonate, $ZnCO_3$	e.g. 31	yellow (when hot)
B	magnesium carbonate, $MgCO_3$	e.g. 21	(remains) white
C	unknown metal carbonate, **X**CO_3	e.g. 28	(green to) black

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(ii) **A**: a value of time (in seconds) **AND** yellow / yellow when hot (ignore references to the limewater) ;

(iii) **B**: a value of time **AND** white / no change / same (ignore references to the limewater) ;
C: a value of time **AND** black (ignore references to the limewater) ; [2]

(iv) 1 (fastest) = one with shortest time
2 = one with intermediate time
3 (slowest) = one with longest time ; [1]
(note: this must be consistent with candidates' results)

(v) carbon dioxide / CO_2 ; [1]

(b) (i)

metal	**observations**
zinc	bubbles ;
magnesium	fast bubbles / gets hot / metal disappears ;
X	no reaction ;

[3]

(ii) 1 (most reactive) = magnesium (**B**) ;
2 = zinc (**A**) ;
3 (least reactive) = **X** (**C**) ; [1]
(this response must relate to the results in **(b) (i)**. If there are no results in **(b) (i)** then the answer must be as above.)

(iii) *yes* (if answer to **(a) (iv)** is Mg, Zn, **X** (**B**, **A**, **C**) or **X**, Zn, Mg (**C**, **A**, **B**))
AND order is same / reverse order compared with order in **(b) (i)** ;

OR

no (if answer to **(a) (iv)** is not Mg, Zn, **X** (**B**, **A**, **C**) or **X**, Zn, Mg (**C**, **A**, **B**))
AND not in same / reverse order compared with order in **(b) (i)** ; [max 1]

(c) (i) blue ppt. / grey-blue ppt. / green-blue ppt. ; [1]

(ii) brown / black solid **OR** zinc turns brown / black ;
bubbles / effervescence / colourless solution / solution less blue / gets hot ; [2]

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(iii) **X** = copper / Cu ; (note: do **not** allow copper(II) / Cu^{2+})

evidence 1 and evidence 2:
any two for one mark
blue ppt. with NaOH (in **(c)(ii)**) **and** / **or** blue solution in **(c)** ;
copper carbonate is green ;
copper oxide is black ;
brown solid (in **(c)(ii)**) ;
displacement by zinc gives brown solid ;
X is brown ;
X does not react with acid ; [max 1]

[Total: 15]

3 **(a)** any five readings (allow full reading from clock) ;
any complete column of readings (allow full reading from clock) ;
all 15 readings entered (allow full reading from clock) ;
average of readings increasing from θ = 10° to 30° ;
all readings recorded to 0.1 s ; [5]

(b) **(i)** all 3 averages correctly calculated to at least 1 decimal place ; [1]

(ii) all 3 **T** values calculated correctly to at least 1 decimal place (average ÷ 10) ; [1]

(iii) **T** increases as angle of swing increases ;
OR a relationship consistent with results ; [max 1]

(iv) when θ is doubled **T** is not doubled / **T** not changing by same factor / other correct statement consistent with candidates' results ; [1]

(c) use of l = 0.30 m ;
correct calculation of **g** to at least 1 decimal place using correct **T** from table which must be squared (allow ecf for l in cm in which case answer is 100 times greater) ;
units of m s^{-2} or m / s^2 ; [3]

(d) **(i)** any errors are reduced (divided by ten) / reduced effect of timing error ; [1]

(ii) simultaneous release of pendulum and starting stop clock ;
judging completion of oscillations ;
timing of 10 oscillations / human reaction time (do **not** allow just 'timing') ;
measuring length of pendulum to centre of bob ;
measuring angle accurately / protractor not positioned correctly ; [max 1]

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(iii) light gate or auto release timer ;
more oscillations ;
measure bob with callipers and measure cotton accordingly ;
set up protractor with a plumb line to check alignment ; [max

[Total: 15]