CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0654 CO-ORDINATED SCIENCES

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

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.

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CAMBRIDGE
International Examinations

1 (a) (i) (any) blue / no change ; [1]

(ii) colourless / like water / clear ; [1]
(ignore: stayed the same)

(b) (i) turns white / pink **AND** indicates water is produced / present ; [1]

(ii) turns milky / cloudy / white ppt. ; *(allow: murky)*
(indicates) carbon dioxide / CO_2 ; [2]

(c) heat produced / temperature increase ;
light produced / glows / fire / flame / smoke ; [2]

(d) a control / show that water not already present / show that carbon dioxide not already present ; [1]

(e) (i) respiration ; [1]

(ii) glucose / food / cheese + oxygen (**not** air) $\rightarrow$ carbon dioxide + water
LHS correct = 1 ; RHS correct = 1 ; [2]

(f) goggles / hair tied back / Bunsen at safe distance / keep maximum distance from burning food / accept other sensible suggestions ; [1]
(ignore: test-tube holders as in diagram)

(g) (i) same mass of water / same volume of water / same amount of water ;
same distance to test-tube ;
same volume of water ;
same **start** temperature of water ;
same mass of food ; [max 2]
(ignore: same time of burning)

(ii) heat loss / incomplete burning ; [1]

[Total: 15]

2 (a) (i) value of time greater than or equal to 10 s ; [1]
(allow: answers in minutes and seconds)

(ii) value within 10% of first value ;
both values to nearest second ; [2]

(b) (i) Fe^{2+} value less than both values in **(a)** ; [1]

(ii) Fe^{3+} value less than both values in **(a)**, **AND** to nearest second ; [1]

(iii) $\mathbf{X}^{2+}$ value less than or equal to 5 s / $\mathbf{X}^{2+}$ value is 'instant' ; [1]

(c) (i) at least **four** $\frac{1}{t}$ values calculated correctly *(ignore s.f.)* ; [1]
(if t = 0 allow $\frac{1}{t}$ *to be left blank or infinity but do **not** allow zero)*

(ii) they are catalysts ;
$\frac{1}{t}$ (rate) increased (with addition of metal ion) / time decreased (with addition of metal ion) ; [2]

(d) reliable as within 10% (or other suitable percentage or comment)
OR
not reliable as greater than 10% difference (or other suitable percentage or comment) ; [1]
(answer must demonstrate an understanding of reliability)
(ignore: references to accuracy)

(e) (i) add 1 cm^3 water / add 5 drops + 1 cm^3 starch ;
*(do **NOT** allow: 0.5 cm^3 more of **A** and 0.5 cm^3 more of **B**)*
total volume should be same as in **(b)** / equivalent volume to metal ion / to keep concentrations the same ; [2]
(mark independently)

(ii) ppt. / white ppt. / cream ppt. / instant blue-black / instant reaction / more brown ; [1]

(f) blue ppt. / dark blue solution ;
X is copper / Cu *(depends on blue in first marking point)* ; [2]
(allow: Cu^{2+} or copper(II) for second marking point)

[Total: 15]

3 (a) *h* **AND** *D* **AND** *d* recorded ;
h > *D* > *d* ;
all values to the nearest 0.1 cm ;
d_A calculation correct ;
V calculation correct ;
V given as whole number ; [6]

(b) (i) V_w correctly calculated with working shown, e.g. subtraction of two values ;
V_w is supervisor's value ± 20 cm^3 *(can get this accuracy mark without calculation)* ; [2]

(ii) cup not completely full / measuring cylinder not read at eye level / measuring cylinder not read perpendicularly / measuring cylinder not read from bottom of meniscus / water spilled on transfer / R_2 off scale of measuring cylinder ; [max 1]

(iii) V_W since difficult to measure *h* / V_W since *d* (or *D*) not inside diameters / V_W since it is a direct measurement / V_W since *V* is an approximation / V_W is actual measurement whereas *V* uses a formula ; [max 1]

(c) (i) evidence of at least 2 loops of string around cup ;
(this could be in words or from diagram and could be in different positions or one position repeated)
correct averaging of two or more measurements for value of *C ;*
answer to 0.1 cm *(independent mark)* ; [3]

(ii) diagram showing correct positioning of one loop, e.g. half way up / at top / at bottom ; [1]

(iiii) calculation correct to 2 or 3 s.f. ; [1]

[Total: 15]