MARK SCHEME for the October/November 2015 series

0654 CO-ORDINATED SCIENCES

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

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) X^{2+} value less than or equal to 5 s / 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]