



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

0653/51

Paper 5 Practical Test

October/November 2016

MARK SCHEME

Maximum Mark: 30

Published

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1 (a) cation

add sodium hydroxide solution / NaOH **AND** green ppt ;
(ALLOW gas changes red litmus to blue)

iron(II) / Fe^{2+} ;

anion

add barium nitrate (solution) / $\text{Ba}(\text{NO}_3)_2$ **AND** white ppt ;

sulfate / SO_4^{2-} ; [4]

(b) (i) colourless solution ;

fizzing / bubbles / effervescence ;

lighted splint pops ;

hydrogen / H_2 (depends on use of splint) ; [4]

(ii) white ppt. ;

(element **L** is) zinc / Zn ; [2]

2 (a) time / minutes ;

(beaker) **A** and (beaker) **B** / water and iodine solution ; [2]

(b) (i) initial observation for **both** as cloudy / colourless / milky / white ; [1]

(ii) full set of results for both beakers ;
beaker **A** – no change to observation ;

beaker **B** – observation changes to blue-black / black ;
note: if all observations are black then **(b)(i)** not scored but award this ecf [3]

(c) iodine (molecules) move into bag ;

by diffusion / because molecules are small enough ;

starch and iodine produce blue-black / black / darker colour ; [3]

(d) (blue-black) colour goes / colour fades / goes brown / goes orange /
goes yellow ; [1]

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- 3** (a) (i) sensible time = $31\text{s} \pm 0.5$ (accuracy mark) ; [1]
- (ii) time recorded and less than that in (i) ; [1]
- (iii) all time values recorded with pattern of decreasing values ; [1]
- (b) (i) T values calculated correctly (ignore no. of decimal places) ; [1]
- (ii) complete set of T^2 values recorded correctly rounded to 1 decimal place ; [1]
- (c) (i) at least four plots correct to $\frac{1}{2}$ small square ;
- good best-fit line judgement ; [2]
- (ii) (triangle method used) at least half of the line and indication on graph of how data obtained ;
- correct calculation using graph ; [2]
- (d) 9.8 ± 0.3 (accuracy mark) ; [1]



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- 1 (a) full set of results ;
- all results to the same number of decimal places ;
- evidence that reaction is slowing at end (not linear increments) ; [3]
- (b) axes labelled with units ;
- linear scale using at least half the grid ;
- at least 4 plots correct $\pm$ half small square ;
- best fit curve ; [4]
- (c) (i) any **two** (for one mark) from:
- constant volume of hydrogen peroxide / constant concentration of hydrogen peroxide / constant size of celery / pH / type of celery [1]
- (ii) at least 5 stated temperatures ;
- at least two temperatures below 40 °C and two temperatures above 40 °C ; [2]
- 2 (a) (i) T_i for concentration 1.00 X ; [1]
- (ii) T_h for concentration 1.00 X recorded to nearest half degree **AND** above T_i ; [1]
- (iii) T_h for concentration 0.75 X recorded
AND ΔT for 0.75 X lower than ΔT value for 1.00 X ; [1]
- (iv) T_h for concentration 0.75 X recorded
AND ΔT for 0.75 X lower than ΔT value for 1.00 X ; [1]
- (v) remaining T_i and T_h values for 0.50 X and 0.25 X ;
- ΔT values decrease down table ; [2]
- (b) (i) all ΔT values recorded and correct for temperatures recorded (minimum three experiments) ; [1]
- (ii) supports **AND** evidence e.g. 1.00 X to 0.50 X halves ΔT
OR
does not support **AND** evidence e.g. 1.00 X to 0.50 X nowhere near halves ΔT ; [1]
- (iii) plot a graph ΔT of against concentration ; [1]

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(c) lid/insulation around flask / rinsing (and drying) of small beaker/extra points/more accurate thermometer ; [1]

3 (a) (i) a recorded to the nearest 0.1 cm ; [1]

(ii) b value correct ($b = 35 - a$) ; [1]

(iii) note the reading on either side and find mean/measure cube and mark the centre point ; [1]

(b) M recorded to the nearest gram ; [1]

(c) m correct ;

2/3 significant figures [2]

(d) mass of clay recorded ; [1]

(e) any **two** from:
centre of gravity of the rule not at the 50 cm mark/difficulty in obtaining balance/rounding errors/pivot not perpendicular to edge of rule/centre of gravity of cube not over the mark due to irregular shape ;; [2]

(f) a smaller and b larger ; [1]