MARK SCHEME for the October/November 2013 series

0654 CO-ORDINATED SCIENCES

0654/63   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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

1 **(a)** sensible scale on y-axis, 20 °C or 25 °C per 5 squares, labelled time / s ;
at least 4 out of 5 accurate plots, ± ½ square ;
smooth best fit curve between 1% and 5% IGNORE outside this range ; [3]

(b) (time at) 2% / **B** (is short,)/(time at) 3% / **C** (is too long,) **AND** because of wrong solution or dilution / volume / difficulty with end-point / variation in temperature / variability of biological material ; [1]

(c) any estimate of less than 20 secs ; [1]

(d) (i) repeat using different temperatures / heat the mixture ;
water bath mentioned / at least four different temperatures ;
keep urease concentration / %age constant ; [3]

(ii) graph with temperature on horizontal axis, time on vertical axis IGNORE unit ;
time shows decrease then increase ;
OR
graph with temperature on horizontal axis, rate on vertical axis IGNORE units ;
time shows increase then decrease ; [max 2]

[Total: 10]

2 **(a) (i)** 1.2 (A) ;
2.3 (A) ;
6.5 (V) ; (no tolerance) [3]

(ii) 6.5/1.2 = 5.4 (ohms) (ecf) (accept any number of decimal places BUT rounding must be correct) ; [1]

(iii) 6.5/2.3 = 2.8 (ohms) (ecf) ; [1]

(b) 6.5/0.75 = 8.67 (ecf) ; [1]

(c) 5.4 + 2.8 = 8.2 and 8.67 (ecf) ;

either: 8.2 to 8.67 similar so within experimental error ;
OR 8.2 different to 8.67 and a reason for this e.g. variability of equipment such as different wires/different meters ignore pupil error e.g. read the meter wrong ; [max 2]

(d) (i) lamp **X** is less bright than **Y** (or lamp **Y** is brighter than **X**) ; [1]

(ii) lamps in Fig. 2.3 / series are less bright than in Fig. 2.1 / parallel, owtte ; [1]

[Total: 10]

3 (a) 26.5 ;
27.5 ;
26.8 ; no tolerance [3]

(b) (i) 8.5, 8(.0) 8.3 (ecf) ; [1]

(ii) exothermic because there was a temperature rise / heat was given out ; [1]

(c) the same volume / amount / concentration of alkali / OH⁻ was used each time / the same mass / amount of water was formed each time ; [1]

(d) errors in measuring (volume or temperature) will be the same ;
the temperature (rise) will be greater ;
OR
faster reaction ;
smaller heat loss ; [max 2]

(e) *name of test solution:* silver nitrate (accept $AgNO_3$) / lead nitrate (accept $Pb(NO_3)_2$;
observation: white precipitate / solid / deposit / sediment (both words necessary) ;
(observation dependent on the correct reagent) [2]

[Total: 10]

4 (a) (i) increases then decreases ; [1]

(ii) decreases and increases / increasing and decreasing / increases in dark and increases in the light ; [1]

(iii) (carbon dioxide) decreases during (the day due to plants using it for) photosynthesis ;
(carbon dioxide) increases during (the night due to plants') respiration ; [2]

(b) (i) letter **X** drawn on steepest part of the ascendant curve ; [1]

(ii) (oxygen taken in due to) respiration (by the plant) ; [1]

(iii) similar line to that provided but values generally lower no part of the line goes above the existing line ; [1]

(c) set up the same but in a darkened room for all experiments ;
vary light intensity by changing distance of a lamp from aquarium / changing brightness of the bulbs by changing resistance / dimmer switch, etc. (active) ;
leave time to settle to conditions ;
measure amount of oxygen and time / datalogger ; [max 3]

[Total: 10]

5 **(a)** **(i)** measuring cylinder, spatula / spoon, stirring rod (any 2) ;; [2]

   (ii) mixture stops bubbling ;
   magnesium carbonate added does not dissolve / solution is cloudy / solid in beaker ; [2]

(b) diagram shows filter funnel and paper, beaker / collecting vessel;
two relevant and correct labels ; [2]

(c) **(i)** evaporate ;
   (heat/boil) to concentrate / saturate / to crystalisation point ;
   leave to cool ; [3]
   (evaporating to dryness scores max 1 mark)

   (ii) suspend a crystal in (saturated) solution, owtte ; [1]

[Total: 10]

6 **(a)** **(i)** reflected beams are parallel ;
   reflected beams are at 30° to the mirror at point of incidence (the line labelling screen should lie within the reflected beam) ;
   (no ruler used 1 max) [2]

   (ii) angle of incidence = angle of reflection ; [1]

(b) straight lines drawn (no mark)
distance between the points where the lines hit the screen = 2.0 cm ($\pm$ 0.2 cm) ; [1]

(c) (i) at least 1 beam bent towards the normal (and not beyond) on entering block ;
beams inside the block are parallel ;
at least 1 beam bent away from the normal as it leaves the block ;
beams leaving the block are parallel to each other ;
beams leaving the block are parallel to incident rays ;   [max 4]
(any four points)
If no ruler lines must be straight

(ii) line drawn at 90° to block ;
both angles correctly labelled ;   [2]

[Total: 10]