UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2007 question paper

0652 PHYSICAL SCIENCE

0652/06   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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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1 (a) (i)   chemical energy(reject "electrical energy")

       (ii)   motion/movement/kinetic/energy

       (iii) (gravitational) potential energy   [1]
              No mark for part if more than one form of energy given

    (b) (i)   current = 6 amps (A) no tolerance
               voltage = 12 volts (V) no tolerance   [2]

       (ii)   600 x 6 x 12 = 43 200 J   (ecf)   [2]

       (iii) 100 x 10 x 20 = 20 000 J   (ecf)   [1]

    (c) (i)   the water tank will overflow/the battery will "be flattened" OWTTE(1)
               (do not accept 'will overheat')

       (ii)   arrange a switch to operate when tank is full/arrange a time switch
              (to operate the battery for a limited period only) OWTTE
              (method must match the answer to (i)) (1)   [2]

                                                                                                [Total: 10]

2 (a) solution X = acid (1) Y and Z (both needed) are alkaline/alkali (1)   [2]

    (b) (i)   barium chloride (nitrate) (solution)   [1]

       (ii)   white (precipitate) (independent mark)   [1]
              Accept milky/chalky

       (iii) sulphuric acid   [1]
              Accept correct formula where given but not hydrogen sulphate

    (c) (i)   Not enough of solution X had been added to react with all of solution Y/
               the pH of the colour change had not been reached (OWTTE)
               (An understanding that sufficient acid must be added)   [1]

       (ii)   The colour changed from pink to colourless   [1]

       (iii) neutralisation   [1]

    (d) solution Y = (sodium/ammonium) hydroxide (1)
         solution Z = (sodium) carbonate (1)   [2]
         (accept lithium or potassium as the metal and allow a correct formula,
         do not allow calcium carbonate for Z, it is not a solution)

                                                                                                [Total: 10]

3 (a) (i) 0.65, 0.53, 0.43 (+/– 0.01 A)

(ii) 25 x 0.045 = 1.1,
60 x 0.045 = 2.7 (ohms) (one or both correct, read first decimal place)

(iii) 1.1 x 0.65 = 0.72
1.8 x 0.53 = 0.95
2.7 x 0.43 = 1.05   (errors carried forward)
2 or 3 values correct (2), 1 correct (1)   [2]*

(b) at least **one** of axes labelled (including unit) and sensible choice of scale (1)
points correctly plotted (ecf) (allow one error, +or– 1 small square) (1)
line drawn through the origin (1)
(if axes reversed, –1 mark)   [3]
(use of OHP overlay can assist marking)

(c) curve is above the first curve, passing through origin   [1]*

*not as on question paper

[Total: 10]

4 (a) (i) before 15 cm^3, after 94 cm^3. +/– 0.5 cm^3, d.p. not needed   [2]

(ii) before 13.82 g, after 13.63 g (+/– 0.01 g)   [2]

(iii) 94 – 15 = 79 cm^3 (1) 13.82 – 13.63 = 0.19 g (1) (ecf)   [2]

(b) 100°C   [1]

(c) (i) 0.2 x 30 000/81 (1) = 74 (1)   [2]

(ii) C_5H_{12} = 60 + 12 = 72 so it is pentane   [1]

[Total: 10]

5 (a) (i) Bunsen burner or other source of heat (1) thermometer (1)

    (ii) fill with water

    (iii) carbon dioxide (or formula) [1]

(b) 125 s, 39 s no tolerance [2]

(c) measure the volume(amount) of the gas/
measure the volume of acid used/use piece of marble of equal mass(size)
other sensible suggestion [1]

(d) use of data to show that at higher temperatures time to react is shorter (1)higher
temperatures give faster reaction (1) [2]

(e) at higher temperatures the particles move faster/collide with the marble more often [1]

[Total: 10]

6 (a) aluminium = 45s, (1) nickel = 69 s (1) no tolerance [2]

(b) (i) metal softens (melts) when heated/is malleable [1]

    (ii) steel (1) it is an alloy/has a high melting point (1)
REJECT any connection with the data in the table [2]

(c) hydrocarbon (1) petroleum/crude oil (1)
OR fat (lipid) (1) animal fat or beeswax (1) [2]

(d) magnesium melts easily OR could ignite OWTTE [1]

(e) lag the metal bars to prevent heat loss/use a controlled form of heating/
other sensible suggestion [1]

(f) metal will conduct heat, glass will not conduct heat
(must be a reference to both materials) [1]

[Total: 10]