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

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

(ii) motion/movement/kinetic/energy [1]

(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)   [3]

  (ii) 25 x 0.045 = 1.1,
  60 x 0.045 = 2.7 (ohms) (one or both correct, read first decimal place)   [1]

  (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]

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5 **(a)** **(i)** Bunsen burner or other source of heat (1) thermometer (1) [2]

      (ii) fill with water [1]

      (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]