
PHYSICAL SCIENCE

8780/04

Paper 4 Advanced Paper

October/November 2016

MARK SCHEME

Maximum Mark: 30

Published

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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- 1 (a) table with headings and all units [1]
- (b) (ii) value of d between 30 cm and 40 cm [1]
- (iii) (initial $T =$) $t/20$ [1]
- (c) 6 recordings of d and t [1]
- minimum 5 values of d approximately evenly spaced and maximum value between 85 to 95 cm [1]
- minimum 5 sets of reading for d and t and all readings recorded to 0.1 cm and 0.1 s [1]
- all calculated d^2 and T^4 calculated correctly from d and T values [1]
- all calculated d^2 and T^4 to consistent number of significant figures and consistent number of significant figures with d and T values [1]
- (d) axes labelled and sensible linear scales [1]
- all accurately plotted within $\pm\frac{1}{2}$ small square and minimum 5 points plotted [1]
- best-fit line [1]
- quality of measurements [1]
- (e) (i) method for determining gradient shown [1]
- (ii) correct T^4 value from intercept from graph on y-axis [1]
- correct T from intercept [1]
- [Total: 15]**
- 2 (a)(i),(ii) bubbles / fizz / effervescence and carbon dioxide formed [1]
- or
colourless solution and all ions/named ions colourless
- or
gets hot and exothermic reaction
- (b) (i) suitable recording of readings with units [1]
- all readings to 0.00 or 0.05 cm³ [1]
- 2 concordant readings within 0.1 [2]
- 2 concordant readings within 0.2, scores 1 mark

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- (ii) calculation of average using concordant volumes [1]
- (c) (i) measuring cylinder used to measure solutions in (a) [1]
- (ii) use a pipette and / or a burette for greater precision [1]
- (d) (i) moles of NaOH = 0.0125 [1]
- moles H₂SO₄ = 0.00625 [1]
- divides nH₂SO₄ by average titre [1]
- (ii) divides nH₂SO₄ by 10 [1]
- (iii) moles of reacted acid = 0.075 – answer to (d)(ii) [1]
- (iv) M_r = 106 [1]
- nNaCO₃ = 106 × answer to (d)(iii) [1]

[Total: 15]