



Cambridge International Examinations
Cambridge Pre-U Certificate

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CHEMISTRY (PRINCIPAL)

9791/04

Paper 4 Practical

For Examination from 2016

SPECIMEN MARK SCHEME

2 hours

MAXIMUM MARK: 40

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 3 Pre-U Certificate.

This document consists of **3** printed pages and **1** blank page.

| | | Expected Answer | Mark |
|----------|----------------|--|-------------|
| 1 | (a) | correct working for volume of H ₂ SO ₄ | [1] |
| | (b) | adds a volume of acid between 2.00 and 4.00 cm ³ | [1] |
| | | total volume to be greater than 10.00 cm ³ beyond their calculated end-point | [1] |
| | (c) | columns labelled as volume, temperature and ΔT | [1] |
| | | all volumes recorded to 0.05 cm ³ | [1] |
| | | all temperatures recorded to 0.5 °C | [1] |
| | | volume at which candidate records maximum ΔT lies within 5.00 cm ³ of volume at which supervisor records maximum ΔT | [1] |
| | | candidate's maximum ΔT lies within 2.0 °C of volume at which supervisor's maximum ΔT (Award 1 mark if $2.0 < \Delta \leq 4.0$ °C) | [2] |
| | (d) | ΔT plotted on y-axis, volume on the x-axis, correctly labelled with appropriate units | [1] |
| | | scales chosen to use more than half of each axis | [1] |
| | | all points plotted correctly, fine cross or encircled dot within $\frac{1}{2}$ small square and within the correct square | [1] |
| | | two smooth intersecting curves drawn | [1] |
| | (e) (i) | reads the volume of H ₂ SO ₄ correctly from the intercept of their lines | [1] |
| | (ii) | shows working in the calculation | [1] |
| | | correct answer given to 3–4 sf | [1] |
| | (f) | first part of the hypothesis is not supported as the graph is a smooth curve | [1] |
| | | second part is supported as temperature falls after the end-point | [1] |
| | (g) | uses nearest added volume to the end-point | [1] |
| | | same amount of heat is now heating a larger volume, calculates 0.10 as a % of the nearest volume | [1] |
| | (h) | notes that heat loss is greater at higher temperatures | [1] |
| | | same amount of heat is now heating a larger volume | [1] |
| | (i) | correct answer from use of $\Delta T \times 4.2 \times \text{volume}$ | [1] |
| | | TOTAL | [23] |

| | | Expected Answer | Mark |
|----------|----------------|---|-------------|
| 2 | (a) | draws up a clear table of results | [1] |
| | | FA 5 gives a green ppt with hydroxide which turns brown in contact with air | [1] |
| | | warming with hydroxide evolves a gas which turns damp red litmus paper blue | [1] |
| | | appropriate test for acid (carbonate etc.) with results (effervescence) | [1] |
| | | FA 5 contains NH_4^+ | [1] |
| | | FA 5 contains Fe^{3+} | [1] |
| | | FA 5 contains H^+ | [1] |
| | (b) (i) | $\text{Ba}^{2+}(\text{aq})$ followed by appropriate dilute named acid OR add dilute acid and test for gas with acidified manganate(VII) | [1] |
| | (ii) | white ppt | [1] |
| | | insoluble in added acid OR no effervescence observed acidified manganate(VII) does not change colour | [1] |
| | | FA 5 contains sulfate | [1] |
| | (iii) | oxidation of sulfite to sulfate has taken place so analyse solution as soon as made up | [1] |
| | (c) (i) | solution turns yellow on adding peroxide | [1] |
| | | on adding hydroxide get a red-brown ppt | [1] |
| | | re-lights a glowing splint | [1] |
| | (ii) | oxidation of Fe^{2+} to Fe^{3+} | [1] |
| | | decomposition of H_2O_2 | [1] |
| | | TOTAL | [17] |

