CHEMISTRY PAPER 3
MARKING SCHEME

1. **TABLE 1** (5 mks)
   (a) **Complete table** (1mk)
       Conditions
   - Complete table with 2 titres (1mk)
   - Incomplete table with 2 consistent titres (1mk)
   - Incomplete table wit 2 consistent titres (0mk)
       Penalties
   - Inverted table
   - Unrealistic titre values (below $1cm^3$ or above $70cm^3$)
   - Arithmetic errors
   - Burette reading beyond $50cm^3$ unless explained. Penalize ½ mk each to a maximum of a ½ mk.

   (b) **Use of decimal point** (1mk)
   - Applied to 1st and 2nd rows only
   - Accept all the values consistently to 1d.p. or 2d.p
   - If to 2 d.p then the last digit be zero of five
   - Accept inconsistency of zeros e,.g 0,0.0, 0.00

   (c) **Accuracy** (**1mk**)
       Any of the candidates' titre values is compared to school values where the candidates can score maximumly.
   - If any is written ±$0.1cm^3$ of SV (1mk)
   - If any is within ±$0.2cm^3$ of SV (½ mk)
   - If none is written ±$0.2cm^3$ of SV (0mk)
   - If arithmetic error was done compare SV with the correct values if he/she can earn more marks.

   (d) **Principle of averaging** (1mk)
       The value to be averaged must lie within ±$0.2cm^3$ of each other.
   - If three consistent values averaged (1mk)
   - If only two are possible and averaged (1mk)
   - If three are possible and only two averaged (0mk)
   - If three inconsistent values averaged (0mk)
   - If the find average gives more than 2 d.p, then this can only be rounded off to 2 d.p and not less otherwise penalize ½ mk at the final answer if rounded up to less.
   (e) **Final answer** (1mk)
       The average titre value is compared to S.V again
   - If within ±$0.1cm^3$ of S.V (1mk)
   - If written V$0.2cm^3$ of S.V (½ mk)
   - If outside ±$0.2cm^3$ of S.V
       NB: (i) If arithmetic error was made, compare with the correct average values following P.A

   (ii) If 2 averages are possible, pick the one benefitting the candidate and award accordingly.

CALCULATIONS

(a) (ii) Moles of sodium hydroxide

$$= 0.5 \times \frac{25}{1000} = 1.25 \times 10^{-2} \text{ moles}$$

   (iii) Moles of H_2SO_4 = ½ x answer (ii)

                 = Correct answer

   (iv)   Conc = answer (iii) x $\dfrac{1000}{\text{Answer (i)}}$ = current answer

                     OR

$$\frac{M_a V_a}{M_b V_b} = ½$$

$$M_a = \frac{M_b V_b}{2V_a} = \frac{0.5}{2} \times \frac{25}{\text{answer (i)}} = \text{correct answer}$$

(b) **TABLE II**   (5mks)

  Complete table   (2mks)

    8 - 9 value   (2mks)

    6-7 values   (1mks)

    Below 6 values   (0mks)

  Decimal point   (1mk)

- All values recorded to whole numbers of up to 1d.p which if point 0 or point 5.

  Accuracy

Teachers temperature reading at volume of 0-.5M NaOH = $0cm^3$ compared to candidates corresponding reading.

- If within ±2°C   (1mk)

    Trend   (1mk)

- A continuous rise (½mk) followed by continuous fall (½ mk)
- Or continuous rise then constatnt followed by continuous fall

  (i)   Graph   (4mks)

        Labeling   (1mk)

        ½ mk for each axes, ignore units if missing otherwise penalize fully if wrong units are used.

        Scale   (1mk, 2/3 of graph paper)

        Plotting   (1mk, all currently plotted)

        Line   (1mk)

        Accept all extrapolated lines for 1mk

  (ii)   I.   Showing ΔT on graph   (½ mk)

          Correct reading   (½ mk)

        II. Showing of volume   (½ mk)

          Correct reading   (½ mk)

  (iii)   Moles of acid = 1 x $\dfrac{20}{1000}$

                              = 0.02

(iv)   H=MCΔT
           = (20+b(ii) II) x 4.2 x Ans b(ii) I
           = Correct answer (J or kL)

(v) ΔH_{neut} = $\dfrac{b(iv)}{b(iii)}$ = correct answer (J/mol, kJmol)

           NB: If negative sign is missing at the final answer, penalize ½ mk.

2.

(a) No white ppt/solid (1mk)		Zn^{2+}, Al^{3+} or Pb^{2+} absent 3 – mention - 2mks 2 – mention - 1mk 1 - mention - 0mk
(b) No white ppt/solid (1mk)		SO_4^{2-}, SO_3^{2-} or CO_3^{2-} absent 3 – mention - 2mks 2 - mention - 1mk 1 - mention -0mk
(c) Brown solution/yellow solution/brownish yellow Reject orange solution (1mk)		Br^- or 1^- ions present (1mk), ½ mk each
(d) Brown solution/black ppt Reject – Brown ppt - Grey ppt (1mk)		1^- ions confirmed present (1mk)
(e) Bright yellow ppt. (1mk)		1^- ions confirmed present Credit even if missing in (c) and (d) above (1mk)