SERIES 39 EXAMS

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 V0.2cm^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

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

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

= Correct answer

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

OR

$\frac{M_aV_a}{M_b\ V_b} = ½$

$Ma = \frac{M_b\ V_b}{2V_a} = \frac{0.5}{2} \times \frac{25}{\text{answer (i)}}$ = 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 $\pm 2^oC$ (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 = $1 \times \frac{20}{1000}$

= 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} = $\frac{b(iv)}{b(iii)}$ = 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)